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H Author/Requestor

D L. Dyekman

(Print and Sign)

Responsible Manager

L P. Diediker 12-11-03

(Print and Sign)

I Reviewers

	Yes	Print	Signature	Public Y/N (If N, complete J)
General Counsel	☒	Leland F. Willis		Y / N
Office of External Affairs	☐			Y / N
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Facility Effluent Monitoring Plan for the Plutonium Finishing Plant

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Fluor Hanford
P.O. Box 1000
Richland, Washington

Contractor for the U S Department of Energy
Richland Operations Office under Contract DE-AC06-96RL13200

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D. L Dyekman
Fluor Hanford

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Prepared for the U.S Department of Energy
Assistant Secretary for Environmental Management

Fluor Hanford
P.O. Box 1000
Richland, Washington

Contractor for the U S Department of Energy
Richland Operations Office under Contract DE-AC06-96RL13200

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Approved By	L P Diediker, Manager Monitoring and Reporting Group	12-10-03 Date

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FACILITY EFFLUENT MONITORING PLAN FOR THE PLUTONIUM FINISHING PLANT

ABSTRACT

Environmental monitoring is required by the U S. Department of Energy in Order 450 1 for any operations that involve hazardous materials and radioactive substances that could impact employee or public health and safety, or the environment The purpose of environmental monitoring is to detect and characterize releases from DOE activities, assess impacts, estimate the dispersal patterns in the environment; characterize pathways, exposures and doses to individuals, members of the public, and to the population; and to evaluate the potential impacts to nearby biota This facility effluent monitoring plan assesses effluent monitoring systems and evaluates whether these systems are adequate to ensure the public health and safety as specified in applicable federal, state, and local requirements

This facility effluent monitoring plan ensures long term integrity of the effluent monitoring systems by requiring an update whenever a new process or operation introduces new hazardous materials or significant radioactive materials This document should be reviewed annually and updated as necessary The Hanford Site Environmental Monitoring Plan (EMP) DOE/RL-91-50 is reviewed annually and updated every three years

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GLOSSARY

ABBREVIATIONS AND ACRONYMS

ABCASH	Automated Bar Coding of All Samples at Hanford (database)
AOP	Air Operating Permit
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
BAT/AKART	best available technology/all known available reasonable treatment
BCAA	Benton Clean Air Authority
BED	Building Emergency Director
CAM	continuous air monitor
CCL4	carbon tetrachloride
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	Code of Federal Regulations
CX	categorical exclusion
DCG	Derived Concentration Guide
DOE	U S Department of Energy
DOE-RL	U S. Department of Energy, Richland Operations Office
DST	Double Shell Tank System
EA	environmental assessment
Ecology	Washington State Department of Ecology
EDE	effective dose equivalent
EDP	Electronic Data Processing
EIS	environmental impact statement
EMP	environmental monitoring plan
EPA	U S. Environmental Protection Agency
FEMP	facility effluent monitoring plan
FFCA	*Federal Facility Compliance Agreement*
FH	Fluor Hanford
HEPA	high-efficiency particulate air
HNF	Hanford Nuclear Facility (document identifier)
HVAC	heating, ventilation, and air conditioning
LLWTF	Low-Level Waste Treatment Facility
MPR	maximum public receptor
MEI	maximally exposed individual
MT	miscellaneous treatment
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFM	Near Facility Monitoring
NOC	Notice of Construction

NPDES	National Pollutant Discharge Elimination System
ONC	Occurrence Notification Center
PFP	Plutonium Finishing Plant
PM10	particulate matter less than 10 microns in size
PNNL	Pacific Northwest National Laboratory
PRF	Plutonium Reclamation Facility
PSF	Plutonium Storage Facility
QA	Quality Assurance
QAPjP	quality assurance project plan
ROD	Record of Decision
RQ	Reportable Quantity
RTAM	Regulatory Technical Assistance Meeting
SNM	special nuclear material
SPOC	single point of contact
TAP	toxic air pollutant
TEDF	Treated Effluent Disposal Facility
VLAW	very low activity wastewater
WAC	Washington Administrative Code
WDOH	Washington State Department of Health
WHC	Westinghouse Hanford Company
	Waste Sampling and Characterization Facility

DEFINITIONS

Administrative Control Values Contractor-imposed radionuclides and hazardous material release limits usually based upon as low as reasonably achievable (ALARA) goals for protection of the public.

Crib Subsurface liquid waste disposal system that allows liquid waste to percolate into surrounding soil.

Dangerous Waste Washington State designation for solid wastes specified in WAC 173-303-070 through 173-303-103

Discharge Point or Effluent Discharge Point The point at which an effluent or discharge enters the environment from the facility in which it was generated

Effective Dose Equivalent (EDE). The summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor This sum is a risk-equivalent value and can be used to estimate the health-effects risk of the exposed individual The tissue-specific weighting factor represents the fraction of the total health risk resulting from uniform whole-body irradiation that would be contributed by that particular tissue EDE includes the committed effective dose equivalent (CEDE) from internal deposition of radionuclides and the effective dose equivalent due to penetrating radiation from sources external to the body EDE is expressed in units of rem (or sievert)

Effluent Any treated or untreated air emission or liquid discharge at a DOE site or from a DOE facility.

Effluent Monitoring Measurement of liquid and gaseous effluents for the purpose of characterizing and quantifying contaminants, assessing radiation exposures of members of the public, providing a means to monitor and/or control effluents at or near the point of discharge, and demonstrating compliance with applicable standards and permit requirements

Effluent Sampling The continuous or intermittent collection and analysis of effluent samples for the purpose of characterizing and quantifying contaminants, assessing radiation exposures of members of the public, providing a means to control effluents at or near the point of discharge, and demonstrating compliance with applicable standards and permit requirements.

Environmental Control Limits. Limits based on permit limits and onsite policies as derived from DOE requirements

Environmental Occurrence Any sudden or sustained deviation (categorized as emergencies, unusual occurrences, or off-normal occurrences) from a regulated or planned performance at a DOE operation that has environmental protection and compliance significance Typical occurrences of interest to this document include failure of primary or secondary facility effluent monitoring equipment or a monitored/unmonitored release of regulated materials exceeding administrative control values

Environmental Surveillance The collection and analysis of samples, or direct measurements, of air, water, soil, foodstuffs, biota, and other media from DOE sites and their environs for the purpose of determining compliance with applicable standards and permit requirements, assessing radiation exposures of members of the public, and assessing the effects, if any, on the local environment

Hazardous Substance or Material Solid, liquid, or gaseous material as defined by the following regulations

- Any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance identified in 40 Code of Federal Regulations (CFR) 302 4
- Any *Superfund Amendments and Reauthorization Act* extremely hazardous substance identified in Appendix A of 40 CFR 355
- Any dangerous waste regulated pursuant to WAC Chapter 173-303, "Dangerous Waste Regulations".

Hazardous Waste Solid wastes designated by 40 CFR Part 261, and regulated as hazardous wastes by the EPA or WAC 173-303 This term includes dangerous waste, extremely hazardous wastes, and toxic dangerous waste.

In-line Monitor. A system in which a detector or other measuring device is placed in the effluent stream for performing measurements on the effluent stream

Inventory at Risk The quantity and/or type of radioactive and/or nonradioactive hazardous material present in a facility with the potential to enter a gaseous or liquid effluent stream

Mixed Waste. Waste containing both radioactive and hazardous components regulated by the *Atomic Energy Act of 1954* and the *Resource Conservation and Recovery Act of 1976*, respectively

Noncomplexed. Waste that does not contain the chelating agents ethylenediaminetetraacetic acid, hydroxyethylethylenediaminetriacetic acid, citric acid, or hydroxyacetic acid

Normal Operations A plant operating condition where all processes and safety control devices are operating as designed

Occurrence Report. A written evaluation of an event or condition that is prepared in sufficient detail to enable the reader to assess its significance, consequences, or implications and to evaluate the actions being proposed or employed to correct the condition or to avoid recurrence.

Plutonium Finishing Plant As used in this report, the PFP includes the entire complex, which includes the primary processing facility and the ancillary and support buildings The primary processing facility is referred to as PFP

Primary Environmental Monitors. Monitoring equipment legally required to monitor ongoing discharges In general, this term applies to monitors closest to the point of discharge which are used to determine if discharges are within specified limits

Radioactive Component. Refers to the radionuclides portion of a waste substance.

Releases Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or otherwise disposing of substances into the environment This includes abandoning/discarding any type of receptacle containing substances or the stockpiling of a reportable quantity of a hazardous substance in an unenclosed containment structure

Reportable Quantities That quantity of hazardous substances as listed in 40 CFR 302 that, if released, requires notification as per 40 CFR 302 These quantities also provide a criteria for requiring FEMPs with respect to nonradioactive hazardous substances

Riser. A pipe connected to the top of an underground storage tank or waste pipeline and extended to the surface of the ground Pumps and instruments are inserted into a waste tank or pipe through a riser

Secondary Environmental Monitors Environmental monitoring equipment or activities that, if degraded, will produce a more than minor disruption of a monitoring program An example of a minor effect would be the failure of a unit whose place in the program effectively is duplicated by overlap between one or more components.

Shutdown Condition A condition where all processes involving radioactive and/or hazardous materials are inactive and otherwise stable

Source Term The amount, activity, or concentration and the effective release height of a hazardous or radioactive material in a facility effluent stream at the point of discharge that is available for exposure to personnel either within the facility or beyond the site boundary

Statistically Significant Increase When used in reference to a continuous release of a hazardous substance listed in 40 CFR 302 4, this term refers to the largest 5 percent of all continuous releases Determination of statistical significance is based on any of the following

- Non-parametric statistical test
- Control chart or student t test
- Other tests that have equivalent sensitivity to (a) or (b)

Tank Farm. An area of underground tanks designed to store high-level liquid wastes generated by the reprocessing of nuclear fuel.

Toxic Dangerous Wastes Designation for waste meeting the criteria specified in WAC 173-303-101

Transuranic Any radionuclide having an atomic number greater than 92

Underground Injection. Subsurface emplacement of fluids through a bored, drilled, or driven well or through a drywell where the depth of the drywell is greater than the largest surface dimension

Upset Condition Any one condition that is outside the normal process operating parameters, or an unusual operating condition where one material confinement/containment barrier or engineered or administrative control has failed.

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FACILITY EFFLUENT MONITORING PLAN FOR THE PLUTONIUM FINISHING PLANT

1.0 INTRODUCTION

The U S Department of Energy (DOE) Organization Act of 1977 and the Atomic Energy Act of 1954, as amended, provide for the protection of the health and safety of the public and the environment This document is prepared to meet U S. Department of Energy (DOE) Order 450 1 requirements that specify environmental monitoring for each site, facility, or process that uses, generates, releases, or manages significant pollutants of radioactive or hazardous materials that could affect public and personnel safety and the environment

This Facility Effluent Monitoring Plan (FEMP) document is part of the larger Hanford Site Environmental Monitoring Plan (EMP) which specifically are intended to meet this requirement for PFP The two major components of an environmental monitoring plan (EMP) consist of a facility effluent monitoring plan (FEMP) and an environmental surveillance plan Fluor Hanford has the responsibility for the preparation of the FEMP at the Plutonium Finishing Plant (PFP). The FEMP for the PFP provides information on effluent characteristics and the effluent monitoring systems, radioactive and hazardous material source terms related to specific effluent streams, and discharge points

1.1 POLICY

It is the policy of DOE and Fluor Hanford (FH) to conduct effluent monitoring to determine whether the public and the environment are adequately protected during DOE operations and whether operations are in compliance with DOE and other applicable federal, state, and local emission standards and requirements It is also the policy of DOE and FH that effluent monitoring programs meet high standards of quality and credibility and comply with federal, state, and local emission standards and requirements

1.2 PURPOSE

The purpose of this FEMP is to assess the magnitude of routine and potential liquid and airborne effluent releases from the PFP to determine the compliance of effluent monitoring systems and sampling programs with respect to applicable federal, state, and local regulations

1.3 SCOPE

The scope of this document includes program plans for monitoring and characterizing radioactive and nonradioactive hazardous materials discharged in the PFP complex effluents This FEMP includes complete documentation for both gaseous and liquid effluent monitoring systems that monitor radioactive and nonradioactive hazardous pollutants that could be discharged to the environment under routine and/or upset conditions. This documentation is provided for each facility that uses, generates, releases, or manages significant quantities of radioactive and nonradioactive hazardous materials that could impact public and employee safety and the environment This FEMP describes the airborne and liquid effluent paths and the associated sampling and monitoring systems of the PFP complex. The FEMP also provides sufficient information on the effluent characteristics and the effluent monitoring systems so that a compliance assessment against requirements could be performed Adequate details are supplied so that radioactive and hazardous material source terms could be related to specific effluent streams that are, in turn, related to discharge points and finally, compared to the effluent monitoring system capability Details are provided only for those streams determined previously to require a FEMP

1.4 DISCUSSION

The characterization of the radioactive and nonradioactive hazardous constituents in each effluent stream provides the underlying rationale for the sampling and monitoring programs The method of characterization discussed in this FEMP identifies potential pollutants at the point of generation and tracks the hazardous constituents in effluent streams to the point of discharge

A FEMP is required if any of the following criteria are met

- the total projected dose from radionuclides exceeds 0 1 mrem per year effective dose equivalent (EDE) from any one discharge point,
- if any one regulated material discharged over a 24-hour period from a facility exceeds 100 percent of a reportable quantity (RQ) as listed in 40 Code of Federal Regulations (CFR) 302 4,
- a liquid effluent is discharged to the Columbia River and contains radionuclides that would cause any person consuming that effluent to receive an EDE greater than 4.0 mrem exposure annually

DOE guidance also requires a FEMP evaluation to consider anticipated facility upset conditions

Information is included from the *Facility Effluent Monitoring Plan Determination for the 200 Area Facilities* (WHC-EP-0440) and the "Facility Effluent Monitoring Plan Determination for the Treated Effluent Disposal Facility" (WHC Correspondence 018C0-95-036), and is evaluated with respect to whether effluents from PFP meet the criteria for requiring a FEMP This original determination was made in accordance with *A Guide for Preparing Hanford Facility Effluent Monitoring Plans* (WHC-EP-0438-2) The evaluations were based on information obtained in documents, interviews with cognizant engineers, and personal observations Subsequent to the original FEMP determination, additional relevant information regarding the 296-Z-3 and 296-Z-7 Stacks was obtained from Notices of Construction

Based on the calculated unabated emissions EDE exceeding 0 1 mrem, gaseous effluent streams from the 291-Z-1 Main Stack, the 296-Z-3 Stack, and the 296-Z-7 Stack were evaluated per HNF-PRO-15334 as requiring a FEMP. Details of the 291-Z-1, 296-Z-3 and 296-Z-7 Stack effluent streams, and the associated monitoring and sampling systems are included in this FEMP. Limited information on other stack air effluent streams is also provided.

Many of the liquid streams, originally identified in WHC-EP-0440 as having a potential for creating a contamination release have been eliminated as sources This effectively has eliminated the liquid stream identified as 216-Z-20 from the list of liquid effluents requiring a FEMP Furthermore, the effluents discharged to the French drains are not contaminated French drains are being managed as discussed in DOE/RL-96-40 "Miscellaneous Streams Best Management Practices Report" The PFP east and west sanitary sewer lines were modified to form a common discharge to the Washington State permitted 2607-W1 tile field The east and west tile fields are inactive and abandoned The 216-Z-13 French drain is isolated from its source and is no longer a soil column discharge point

None of the following liquid streams meet the FEMP preparation criteria

- 200 Area TEDF effluent (formerly 216-Z-20 crib and 216-Z-21 seepage basin)
- East tile field [sanitary sewer line (inactive)]
- West tile field [sanitary sewer line (inactive)]
- French drains

For more historical information on liquid effluents streams, see section 4.0 of this document

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2.0 FACILITY DESCRIPTION

Brief descriptions of the physical characteristics of PFP, the primary processes, and information with respect to potential process source terms are provided in this section Information on certain support buildings also is presented

2.1 BRIEF FACILITY PHYSICAL DESCRIPTION

In 1943, the federal government selected the Hanford Site as part of the Manhattan Project to produce plutonium for national defense needs Metallic uranium fuel was irradiated in nuclear reactors at the Hanford Site to produce plutonium Chemical processing separated the plutonium from the other elements in the irradiated fuel The separated plutonium was in the form of plutonium nitrate, which was initially shipped offsite for further processing to produce the metallic form used in nuclear weapons The post-war construction of the PFP in the 200W Area at the Hanford Site added the capacity to produce metallic plutonium and eliminated the need for offsite shipments

When the PFP's production operations stopped in 1989, most of the processing excess remained either in storage containers or on surfaces DOE recognized that there was a need to stabilize the plutonium-bearing materials to a safer form suitable for interim storage and future use Readily retrievable plutonium-bearing materials needed to be removed and the stabilized fissile materials were to be kept in existing vaults for interim storage

The PFP Complex includes a number of operations and buildings previously involved in the recovery and chemical conversion of plutonium. PFP consists of one primary processing building (234-5Z) and several major ancillary buildings 236-Z, 232-Z, 241-Z, 242-Z, 243-Z, 270-Z, 291-Z, 2736-Z, 2736-ZA, and 2736-ZB Many minor ancillary buildings also exist in the PFP complex. Figure 2-1 shows the arrangement of the PFP Complex

2.1.1 234-5Z Building

PFP, or the 234-5Z Building, has approximate dimensions of 180 feet wide by 500 feet long and extends from 9 5 feet below grade to 46 8 feet above grade Floor levels are designated as the basement, first floor, duct level, second floor, and roof level Noncombustible construction materials were used The frame is of structural steel with an outer sheathing of aluminum panels over rock wool insulation and 16-gauge sheet steel The first floor is a concrete slab, the duct level is sheet-metal roof decking, and the second floor is a concrete slab The roof is constructed of insulated metal decking Interior walls are reinforced concrete steel structure, or metal studs, metal lath, and plaster The vault and process area doors are constructed of steel with combination safe-type locks Liquid effluents from the 234-5Z Building that potentially are contaminated are processed in the low-level waste treatment facility (LLWTF) before being discharged to TEDF Air emissions from this facility are exhausted through the 291-Z-1 stack

2.1.2 236-Z Building

The 236-Z Building, located south of the southeastern corner of the 234-5Z Building, connects to the 242-Z Building The 236-Z Building houses the Plutonium Reclamation Facility (PRF). The building air and glovebox air are filtered in HEPA filters (4 banks, each containing 12 HEPA filters) within PRF prior to being exhausted through the 291-Z-1 Stack Some liquid effluents from the 236-Z Building are processed in the LLWTF and discharged to TEDF Additionally, closed-loop systems eliminated potentially radioactive contaminated liquid effluents from the 236-Z Building Currently, the PRF process is in shutdown status with decommissioning activities as the only planned future operations.

The 236-Z Building, a four-story structure surmounted by a two-story penthouse, is approximately 79 feet wide by 71 feet long. Its outstanding internal structural feature is a single process equipment cell that is 32 feet wide by 52 feet long that extends through the third floor. The building is constructed of reinforced concrete, with the exception of the roof and the fourth floor ceiling The roof is of open-web steel joist framing, steel decking, rigid insulation, and graveled built-up roofing. A portion of the southern building wall is also the south wall of the process cell and includes an opening in the reinforced concrete wall for moving large equipment A door and surrounding block wall fill this opening The concrete block wall has been steel plated and reinforced to withstand seismic effects.

2.1.3 232-Z Building

The 232-Z Building houses the layaway contaminated waste recovery process, commonly referred to as the 'Incinerator' The contaminated waste recovery process currently is undergoing decontamination and decommissioning activities.

The 232-Z Building, a concrete block construction, is 37 feet wide by 57 feet long The building is divided into areas for process, storage, change room, chemical preparation, ventilation, and electrical equipment Except for ventilation supply and exhaust filtration, electrical and steam services from the 234-5Z and 291-Z Buildings are used All drains that discharged liquid to the effluent drain system have been eliminated Air emissions are exhausted through the 296-Z-14 stack

2.1.4 241-Z Building

The 241-Z Building, designated as the waste treatment area, is a buried reinforced concrete structure approximately 20 feet wide, 92 feet long, and 22 feet deep, with a sheet-metal enclosure over the top that houses a hoist for removing cell covers The building consists of five separate enclosures or ventilated cells, each containing a 20,000-liter tank used to accumulate liquid waste before transfer to the Double-Shell Tank System (DST) The building is located approximately 330 feet south of the 234-5Z Building

At the southwest corner of the 241-Z vault deck is the equipment for the vessel vent and vault ventilation system The 24-foot-high 296-Z-3 Stack and its associated fans, filters, and controls are located on a 14-foot by 18-foot concrete pad The cell and tank emissions are exhausted through the 296-Z-3 stack.

2.1.5 242-Z Building

The 242-Z Building houses portions of the waste treatment and americium recovery operations, which are in layaway status and planned for future decontamination and decommissioning There are no liquid effluent streams for 242-Z, and air emissions are filtered via self-contained HEPA filters F-ES-1N, 2N, 1S and 2S, then through the E-3 filter manifold, prior to being exhausted through the 291-Z-1 stack.

2.1.6 243-Z Building

The 243-Z Building is the LLWTF, a 35 feet by 70 feet corrugated aluminum building located south of the 234-5Z Building The LLWTF receives very low activity wastewater (VLAW) from various PFP operations via manhole cover 4 The VLAW is treated and discharged to manhole cover 7 Building air is exhausted through the 296-Z-15 Stack Liquid effluents from this facility are routed to the TEDF

2.1.7 291-Z Building

The 291-Z Building is a reinforced-concrete structure approximately 74 feet wide by 143 feet long by 23 feet high, with only 4 feet above grade, located approximately 53 feet south of the central part of the 234-5Z Building This building houses the exhaust fans, the mechanical service equipment, and the substation

Auxiliary to the 291-Z Building is the 200-foot-high 291-Z-1 Stack Constructed of reinforced concrete, the center of the stack is 63 feet from the near end of the 291-Z Building and 230 feet from the south wall of the 234-5Z Building Liquid effluents are sent to the LLWTF and Z-13, Z-14, and Z-15 french drains Air emissions are exhausted through the 291-Z-1 stack

2.1.8 2736-Z and 2736-ZA Buildings

The 2736-Z Building, the primary plutonium storage facility (PSF), is approximately 65 feet long by 56 feet wide and consists of four rooms for the storage of special nuclear material (SNM), divided by a corridor running the width of the building The building is constructed of reinforced concrete walls, 14 inch thick, supported by cast-in-place concrete columns. The roof is a cast-in-place 6 5-inch-thick concrete slab The 2736-ZA Building provides ventilation for the 2736-Z Building with air from the 2736-Z Building exhausted through the 296-Z-6 Stack located on the roof of the 2736-ZA Building.

2.1.9 2736-ZB Building

The 2736-ZB Building, located immediately to the south of the 2736-Z Building, is approximately 132 feet by 90 feet with reinforced concrete walls (except for administrative areas) and roof Air from the 2736-ZB Building is exhausted through the 296-Z-5 Stack (located on the roof) and the 296-Z-7 Stack located adjacent to the east side of the building The building contains approximately 2,000 square feet of floor space and is used primarily for shipping and receiving plutonium products and miscellaneous solid scrap materials.

2.2 BRIEF PROCESS DESCRIPTION

The following is a brief description of the processes that could occur. As a result of these processes, liquid and gaseous effluents are created

PFP has begun the planning of a facility-wide deactivation and demolition effort which includes activities such as solid waste repackaging, recycling, removal/transfer of solid waste materials to appropriate storage/disposal facilities, onsite treatment, storage and transport of liquid waste, process equipment removal/ disposition, radioactive stabilization/ deactivation/ demolition and utilities disconnection and or modifications (e g , excavation/ capping of pipelines and installation of electrical control panels), asbestos removal and building closure. These activities will be implemented in stages at the various facilities

2.2.1 234-5Z Building Processes

Recent operations in the 234-5Z building include processing activities necessary to remove and stabilize plutonium-bearing materials. These operations were described and analyzed in the PFP Stabilization Final Environmental Impact Statement (EIS) (DOE/EIS-0244-F) issued in May 1996, with the Record of Decision (ROD) issued on June 25, 1996 , and clarified/modified with subsequent supplement analyses, environmental assessments (EAs) and categorical exclusions (CXs) The ROD documents the decision to proceed with a select group of stabilization alternatives identified in the EIS The following lists the primary stabilization alternatives for each of the plutonium bearing inventory categories as identified in the ROD, described by the EIS, and in the EAs and CXs.

- Precipitation of solutions by hydroxide or oxalate followed by thermal stabilization
- Repackaging of metals and alloys using bagless transfer and thermal stabilization of removed corrosion products
- Controlled oxidation followed by batch thermal stabilization for polycubes and combustibles
- Repackaging of low Pu content residues for discard to WIPP using a "Pipe and Go" process
- Stabilization or immobilization for readily retrievable plutonium-bearing materials that can be removed from ductwork, vacuum system piping, gloveboxes, hoods, and the PRF canyon floor
- Transition activities (pursuant to 241-Z, 232-Z and Ancillary Buildings CXs and the Transition EA)

2.2.2 236-Z Building Process

The 236-Z Building houses the PRF process equipment and services for miscellaneous treatment (MT) slag and crucible dissolution, filtrate concentration, feed preparation, plutonium solvent extraction, product concentration, and waste treatment processes Currently the only active operations are clean up and material removal required under the EIS ROD

2.2.3 232-Z, 242-Z, and 291-Z Building Processes

The 232-Z, 242-Z, and 291-Z Buildings do not house active processes The 232-Z Building contains an incinerator facility that is partially decontaminated and dismantled and is being prepared for removal The 242-Z Building previously housed the waste treatment and americium recovery process The 291-Z Building houses a substation, mechanical service equipment, and exhaust fans

2.2.4 2736-Z, 2736-ZA, 2736-ZB Building Processes

Operations in the 2736-Z buildings include vault storage support (shipping, receiving, non-destructive assay, vault inventory and surveillance), stabilization and packaging activities The batch thermal stabilization uses muffle furnaces for oxides and mixed oxides, followed by packaging in a welded can using a bagless transfer process

2.2.5 241-Z Building Process

The 241-Z complex consists of three active structures the 241-Z Building, 241-ZA sampling building, and the 241-ZG change room and three inactive structures the 241-ZB caustic tank, 241-Z-RB retention building and the settling tank 241-Z-361 This complex provided PFP with the capability to temporarily treat, store, and adjust PFP radioactive liquid waste before transfer to the 244-TX receiving facility at Tank Farms.

There are five below grade storage tanks (tanks TK-D4, TK-D5, TK-D6 [inactive], TK-D7, and TK-D8) that are made of stainless steel, and each has a capacity of 4,300 gal Tank TK-D8 receives PFP aqueous wastes The PFP wastes accepted by the 241-Z facility include those from the Plutonium Process Support Laboratory, A-Labs, and periodic flushes from the 26-in vacuum seal water In addition, during plutonium solution treatment operations, the tank may receive filtrate solutions The waste collected in TK-D8 is batch transferred to TK-D5 Waste tank data are periodically recorded on instrument readout charts in the 241-ZA Sampling Building

The 241-Z complex is currently in transition in support of the cessation of discharges to the Tank Farms in accordance with a Tri-Party Agreement milestone This transition is an anticipated initial phase of the operational activities at the facility, supporting terminal cleanout and stabilization and ultimate dismantlement Transition activities consist of removal of waste from tanks, removal of waste from process cells, decontamination, deactivation, equipment removal from below grade cells, and non-contaminated equipment removal

Exhaust air is drawn from the cells and tanks by two separate headers connected to a common header and is then heated, filtered through a two-stage testable HEPA filter, sampled and monitored continuously for radioactivity, and discharged to the atmosphere through the 296-Z-3 Stack The 296-Z-3 stack will be remain operational during all transition activities conducted inside the 241-Z Building

2.2.6 243-Z Building Process

This water treatment facility, known as the Low Level Waste Treatment Facility (LLWTF) was built to support implementation of best available technology/all known and reasonable technology (BAT/AKART) for PFP liquid effluents before discharge to the 200 Area TEDF Liquid waste is treated for organic, inorganic, and radionuclide contamination by passing the water through a series of filter trains consisting of granular activated carbon, bone char, and ion exchange resins The purpose of the LLWTF is to produce water suitable for discharge to the 200 Area TEDF, meeting all discharge limits listed in the State Waste Discharge Permit No ST 4502 for the 200 Area TEDF

2.3 IDENTIFICATION AND CHARACTERIZATION OF POTENTIAL SOURCE TERMS

This section summarizes the potential PFP process source terms Tables 2-1 and 2-2 summarize the source term information originally developed in WHC-EP-0440 and updated for both radioactive and hazardous materials. Some of the values presented are different from those in WHC-EP-0440 because each effluent stream was re-evaluated to incorporate the most recent source term information

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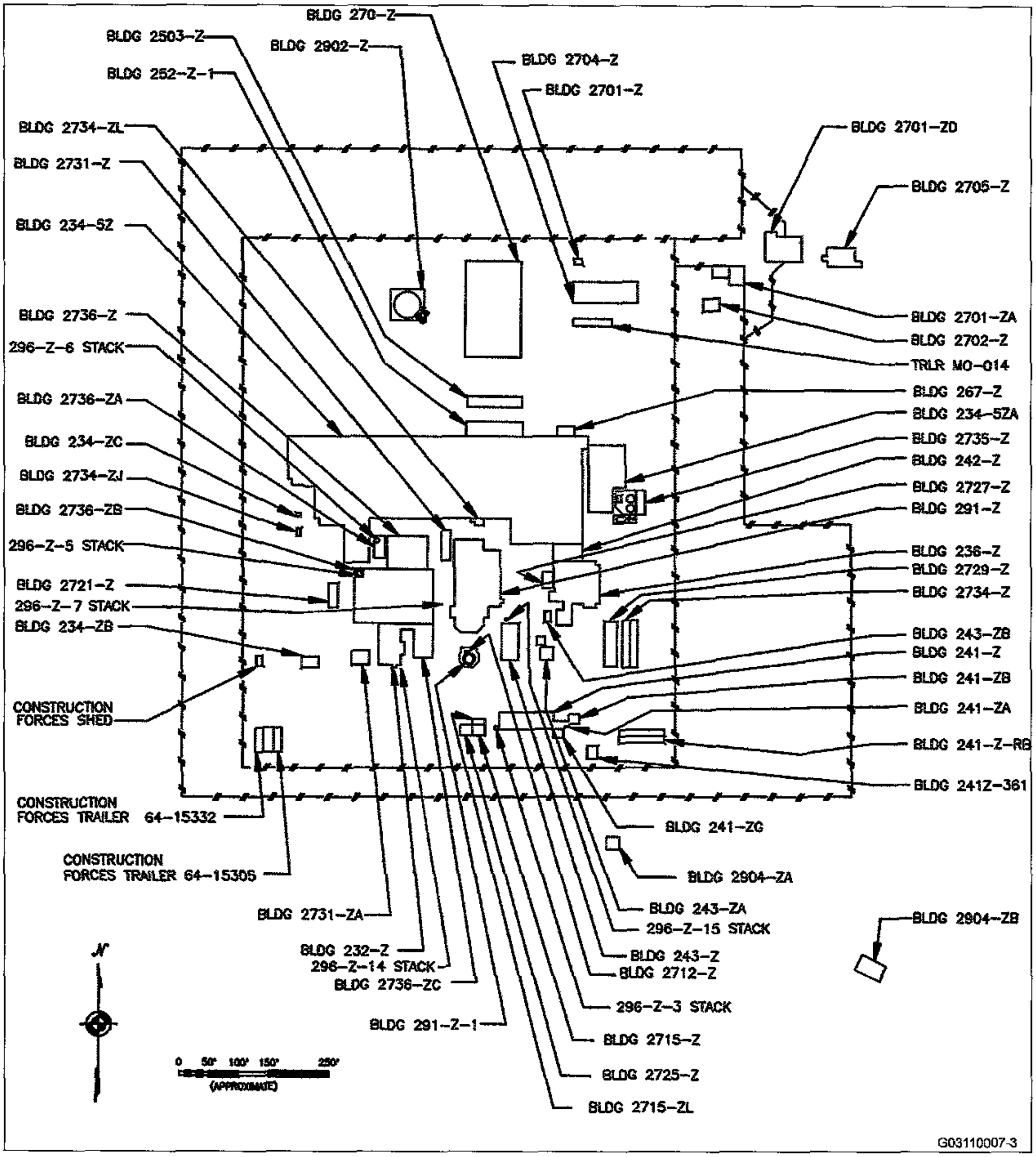

Figure 2-1 Plutonium Finishing Plant Buildings

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Table 2-1 Plutonium Finishing Plant Radioactive Material Potential Source Terms

Radionuclide	Form	Building	Discharge point	Potential quantity released (Ci/yr)[a]	Potential Unabated dose (mrem/yr)[a/b]
Pu-238	Particulate	234-5Z, 236-Z, 242-Z	291-Z-1 Main Stack	1 44 E+05	9 39 E+05
Pu-239	Particulate	234-5Z, 236-Z, 242-Z	291-Z-1 Main Stack	6 1 E+06	4 27 E+07
Pu-241	Particulate	234-5Z, 236-Z, 242-Z	291-Z-1 Main Stack	3 51 E+06	3 86 E+05
Am-241	Particulate	234-5Z, 236-Z, 242-Z	291-Z-1 Main Stack	1 23 E+06	1 35 E+07
Total Beta	Particulate	234-5Z, 236-Z, 242-Z	291-Z-1 Main Stack	9 52 E+04	8 28 E+02
				Total projected dose =	5 75 E+07
Pu-238	Particulate	241-Z	296-Z-3 Stack	4 0 E-04	4 00 E-03
Pu-239	Particulate	241-Z	296-Z-3 Stack	2 0 E-01	2 00 E+00
Pu-240	Particulate	241-Z	296-Z-3 Stack	4 8 E-02	5 30 E-01
Pu-241	Particulate	241-Z	296-Z-3 Stack	9 5 E-01	1 50 E-01
Pu-242	Particulate	241-Z	296-Z-3 Stack	3 0 E-05	3 30 E-04
Am-241	Particulate	241-Z	296-Z-3 Stack	3 3 E-01	5 60 E+00
				Total projected dose =	8 50 E+00
Pu-238	Particulate	2736-ZB	296-Z-5 Stack	4 39 E-04	4 39 E-03
Pu-239	Particulate	2736-ZB	296-Z-5 Stack	1 72 E-03	1 89 E-02
Pu-240	Particulate	2736-ZB	296-Z-5 Stack	7 81 E-04	8 59 E-03
Pu-241	Particulate	2736-ZB	296-Z-5 Stack	4 26 E-02	7 24 E-03
Am-241	Particulate	2736-ZB	296-Z-5 Stack	1 48 E-03	2 51 E-02
				Total projected dose =	6 42 E-02
Am-241	Particulate	2736-Z, 2736-ZA	296-Z-6 Stack	1 45 E-11	2 46 E-10
				Total projected dose =	2 46 E-10
U-233	Particulate	2736-Z, 2736-ZB	296-Z-7 Stack	1 10 E+01	4 62 E+01
Pu-239	Particulate	2736-Z, 2736-ZB	296-Z-7 Stack	1 00 E+02	1 10 E+03
Am-241	Particulate	2736-Z, 2736-ZB	296-Z-7 Stack	3 50 E+01	5 95 E+02
				Total projected dose =	2 34 E+03
Pu-238	Particulate	232-Z	296-Z-14 Stack	3 27 E-06	3 27 E-05
Pu-239	Particulate	232-Z	296-Z-14 Stack	1 28 E-05	1 41 E-04
Pu-240	Particulate	232-Z	296-Z-14 Stack	5 83 E-06	6 41 E-05
Pu-241	Particulate	232-Z	296-Z-14 Stack	3 18 E-04	5 08 E-05
Am-241	Particulate	232-Z	296-Z-14 Stack	1 10 E-05	1 87 E-04
				Total projected dose =	4 76 E-04
Pu-238	Particulate	243-Z	296-Z-15 Stack	4 81 E-10	4 81 E-09
Pu-239	Particulate	243-Z	296-Z-15 Stack	1 63 E-08	1 79 E-07
Pu-240	Particulate	243-Z	296-Z-15 Stack	3 84 E-09	4 23 E-08
Pu-241	Particulate	243-Z	296-Z-15 Stack	8 35 E-08	1 34 E-08
Pu-242	Particulate	243-Z	296-Z-15 Stack	1 31 E-15	1 44 E-14
Am-241	Particulate	243-Z	296-Z-15 Stack	1 80 E-09	3 06 E-08
				Total projected dose =	2 40 E-07

Ci/yr = curies per year mrem/yr = millirem per year.

[a] Potential quantities released and potential projected dose are based on information provided in "Radionuclide National Emission Standards for Hazardous Air Pollutants Potential-to-Emit Assessment", HNF-1974, Rev 1, except for 296-Z-3 and 296-Z-7 for which the values were obtained from the respective Notice of Construction documents.

[b] Value calculated using the CAP88 method (HNF-3602, Vol 1)

NOTE. For actual annual emissions (Ci) for the 291-Z-1 Stack, 296-Z-3 and the 296-Z-7 Stack, refer to Tables 8-1, 8-2, and 8-3, respectively.

Table 2-2 Plutonium Finishing Plant Hazardous Material Potential Source Terms.

Chemical	Building	Discharge point	Releasable quantity (lb/day)[a]	Reportable quantity (lb/day)
NO_x	234-5Z, 236-Z	291-Z-1 Main Stack	<10[a]	10
NO_x	234-5Z, 236-Z	291-Z-1 Main Stack	>10[b]	10
HCl	234-5Z, 236-Z	291-Z-1 Main Stack	20/year	5,000
Polystyrene	234-5Z	291-Z-1 Main Stack	<10[b]	
Acetone	234-5Z, 236-Z	291-Z-1 Main Stack	<10[b]	5,000
NO_x	241-Z	296-Z-3 Stack	<10[b]	10
Benzene	234-5Z, 236-Z	292-Z-1 Main Stack	-----	10
alpha -Methylstyrene	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	-
2-Propenal	234-5Z, 236-Z	292-Z-1 Main Stack	< 10[a]	1
2-Propenoic acid, 2-methyl-, methyl ester	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	1000
Biphenyl	234-5Z, 236-Z	292-Z-1 Main Stack	< 10[a]	100
Ethylbenzene	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	1000
Indene	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	-
Naphthalene	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	100
Phenol	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	1000
Styrene	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	1000
Toluene	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	1000
Xylenes (m-,o-,p- isomers)	234-5Z, 236-Z	292-Z-1 Main Stack	> 10[a]	100

lb/day = pounds per day.

[a] releasable quantities
[b] Upset condition

3.0 APPLICABLE REGULATIONS

Conditions and requirements for monitoring existing or potential releases of radioactive and other chemicals to the environment are contained in DOE Orders and federal, state, and local laws, regulations, and permits Table 3-1 gives a brief summary of the regulations and standards applicable to this FEMP. Because the regulations enforced by these agencies can differ, FH might enforce more restrictive requirements as a matter of policy

3.1 U.S. DEPARTMENT OF ENERGY ORDERS

Facility Effluent monitoring plans (FEMPs) are completed and implemented to meet the overall radioactive and nonradioactive monitoring requirements of U S Department of Energy (DOE) Order 5400 5 and DOE/EH-0173T Prior to January 2003, DOE Order 5400 1 was the basis for facility effluent monitoring plans, but it has been replaced by DOE Order 450 1, which does not specifically mention a sitewide environmental monitoring plan, of which FEMPs are regarded as supporting documents Order 450 1 requires that ISMS's include an EMS that provides for the systematic planning, integrated execution, and evaluation of programs for public health and environmental protection, pollution prevention, and compliance with applicable environmental protection requirements Order 450 1 also requires that environmental monitoring be conducted, as appropriate, to detect and characterize releases from DOE activities, assess impacts, estimate the dispersal patterns in the environment, characterize pathways of exposure to members of the public, and characterize the exposures and doses to individuals, and to the population, and to evaluate the potential impacts to the biota in the vicinity of the DOE activity The site EMP and FEMPs are being used as the vehicles to satisfy applicable portions of DOE Order 450 1 The plan must include the rationale and design criteria for the monitoring program, as well as describe the extent and frequency of the monitoring analysis The plan also must contain quality assurance requirements, program implementation procedures, directions for preparation and implementation of reports, and directions for identification and discussion of effluent monitoring and environmental surveillance.

The effluent monitoring portion of the plan must verify compliance with applicable regulations and DOE Orders The plan also should evaluate the effectiveness of treatment, identify potential environmental problems, evaluate the need from remedial action or mitigation measures, support permit revision and/or reissuance, and detect, characterize, and report unplanned releases

DOE Order 5400 5, *Radiation Protection of the Public and the Environment*, requires a monitoring plan that implements the requirements of DOE Order 450 1 Compliance with the requirements of DOE Order 5400 5 could be demonstrated based on calculations from monitoring and surveillance programs

DOE Order 435 1, *Radioactive Waste Management*, establishes policies, guidelines, and minimum requirements by which the DOE manages radioactive and mixed waste and contaminated facilities

3.2 FEDERAL REGULATIONS

Federal regulations applicable to this FEMP are discussed in the following sections

3.2.1 National Emission Standards for Hazardous Air Pollutants (40 CFR 61, Subpart H)

On December 15, 1989, 40 CFR 61, Subpart H "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities" (commonly referred to as the Radionuclide NESHAP), came into effect This regulation governs portions of the design and implementation of effluent air sampling, and establishes exposure limits and monitoring requirements for Department of Energy facilities The exposure limit for members of the public from radionuclide air emissions is an effective dose equivalent (EDE) not to exceed 10 mrem per year Compliance with this standard is measured by calculating the highest EDE where a person resides or abides using an EPA-approved method

Emissions of radionuclides must be measured at all release points that have a potential to discharge radionuclides into the air in quantities that could cause an EDE in excess of 1 percent of the standard If the EDE caused by all emissions is less than 1 percent of the standard, a facility is exempt from the EPA monitoring requirements. All radionuclides that could contribute greater than 10 percent of the potential EDE for a release point are measured individually. For other release points that have a potential to release radionuclides into the air, periodic confirmatory measurements are made to verify low emissions

To determine whether a release point is subject to emission measurement requirements, the potential for radionuclide emissions for that release point must be evaluated In evaluating the potential of a release point to discharge radionuclides into the air, the estimated radionuclide release rates are based on the discharge of the effluent stream that would result if all pollution control equipment did not exist, but operations otherwise were normal (see table 2-1)

Subpart H also states that effluent streams be directly monitored continuously with an in-line detector or that representative samples of the effluent stream be withdrawn continuously from the sampling site following the guidance presented in American National Standards Institute (ANSI) N13 1. The EPA also has approved an Alternate Method for sampling using single point sampling with a shrouded probe The requirements for continuous sampling are applicable to batch processes when the unit is in operation Periodic sampling (grab samples) could be used only with prior EPA approval. Such approval could be granted in cases where continuous sampling is not practical and radionuclide emission rates are relatively constant In such cases, grab samples will be collected with sufficient frequency to provide a representative sample of the emissions.

The Radionuclide NESHAP (40 CFR 61 Subpart H) was amended as published in the Federal Register (September 9, 2002 FR 57159), and became effective October 9, 2002. The amendment states that newly constructed major sources must sample following the guidance presented in ANSI N13 1 – 1999. The NESHAP Subpart H amendment imposed additional inspection, testing and cleaning requirements on existing facilities still subject to the original ANSI N13 1-1969 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities". Fluor Hanford Regulatory Analysis Memorandum 03-001, June 3, 2003, provides guidance for compliance with the new requirements

The new requirements for existing facilities are contained in the 40 CFR 61, Appendix B, Method 114 – Test Methods for Measuring Radionuclide Emissions from Stationary Sources, in Section 4, Table 2. The Table 2 requirements are briefly listed with no additional explanatory text or referenced guidance provided by EPA. However, EPA does mention in the federal register notice that the additional inspection requirements are " .taken directly from ANSI/HPS N13 1-1999" This infers that guidance regarding the Method 114 Table 2 should be consistent with guidance for any of the equivalent inspections under the ANSI/HPS N13 1-1999

The DOE entered into technical discussions with EPA Region 10 regarding clarification, interpretation and implementation of the new 40 CFR 61 Subpart H Table 2 requirements for existing facilities The discussions took place between February 19, 2003 and August 16, 2003 and were documented in a written summary The meeting summary documents mutual agreement on points of compliance, clarifications of various requirements and EPA's willingness to consider written proposals requesting approval for alternate methods of compliance with Table 2 requirements for individual stacks The summary was submitted to EPA for concurrence on September 3, 2003 EPA's concurred by letter issued September 9, 2003

These new Table 2 requirements apply to the major stacks at PFP (291-Z-1, 296-Z-3 and 296-Z-7)

3.2.2 State Operating Permit Program (40 CFR 70)

This regulation defines the minimum elements required by the *Federal Water Pollution Control Act of 1972* for state operating permit programs and corresponding standards and procedures by which the administrator approves, oversees, and withdraws approval of state operating permit programs

3.2.3 Identification and Listing of Hazardous Waste (40 CFR 261)

This regulation identifies solid waste subject to regulation as a hazardous waste

3.2.4 Designation, Reportable Quantities, and Notification (40 CFR 302)

This regulation designates hazardous substances and identifies reportable quantities and notification requirements for release of these hazardous substances under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) *of 1980* and the *Safe Drinking Water Act of 1974*, as amended

Any unpermitted release of any of these designated hazardous substances must be reported Therefore, if the possibility exists for a facility to release any of the designated substances, waste streams must be monitored for their presence and monitoring practices must be provided in a FEMP

3.3 INDUSTRY STANDARDS UNDER AMERICAN NATIONAL STANDARDS INSTITUTE

Industry standards are discussed in the following sections

3.3.1 Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities (ANSI N13.1)

The primary objective for sampling airborne radioactivity in effluents is to measure the release of radioactive materials to the environment This is accomplished through sampling prior to or near the point of release The objective of ANSI N13 1 is to set forth the principles that apply in obtaining valid samples of airborne radioactive materials and to prescribe acceptable methods and materials for gaseous and particulate sampling. ANSI N13 1 is limited to the collection of samples and does not address measurement of the radioactive materials collected The exclusion of radiochemical measurement from the scope must not be construed to mean that the measurement of samples is of lesser importance than sampling

3.3.1.1 ANSI N13.1 – 1969 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities"

ANSI N13 1 – 1969 applies to major stacks in operation prior to January 2003 The standard is more prescriptive in nature than the 1999 version Following are some criteria from the standard·

- A sample must be representative of the bulk stream or volume from which it is taken, and with respect to physical and chemical composition
- The sampling point should be a minimum of five diameters (or five times the major dimension for rectangular ducts) downstream from abrupt changes in flow direction or prominent transitions
- A multiple number of withdrawal points each representing approximately equal areas based on the duct or stack dimensions is desirable
- The velocity distribution across the duct or stack should be known in order to establish isokinetic flow and representative sample points.
- The velocity of air entering a sampling probe (or the collector when held in the airstream) should be identical to the velocity of the airstream being sampled at that point (isokinetic)
- Sampling line length should be kept to a minimum length and an evaluation should be made of deposition in these lines
- Elbows in sampling lines should be avoided if at all possible, but when they are required the bend radius of the elbow should be al long as practical
- Sensitivity and accuracy of the analytical or counting method will determine the minimum volume of air which must be sampled to obtain the requisite accuracy and precision of results.
- Appropriate filtration should be chose for particulate sampling and radioactive gases or volatile materials should be

3.3.1.2 ANSI/HPS N13.1 – 1999 "Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stacks and Ducts of Nuclear Facilities"

The EPA adopted ANSI N13 1 – 1999 with an amendment to 40 CFR 61, Subpart H, as published in the Federal Register September 9, 2002 ANSI N13 1 – 1999 applies to newly constructed major stacks effective January 2003. Performance-based sampling as described in ANSI N13 1 – 1999 allows the use of single point sampling such as a shrouded probe The performance criteria for sampling nozzle placement and particle transport are described as follows:

- Angular Flow – Sampling nozzles are usually aligned with the axis of the stack If the air travels up the stack in cyclonic fashion, the air velocity vector approaching the nozzle could be misaligned with the sampling nozzles enough to impair the extraction of particles. Consequently, the flow angle is measured in the stack at the elevation of the sampling nozzle The average air-velocity angle must not deviate from the axis of the stack and sampling nozzle by more than 20°
- Uniform Air Velocity – It is important that the gas momentum across the stack cross section where the sample is extracted be well mixed or uniform. Consequently, the velocity is measured at several

points in the stack at the elevation of the sampling nozzle The uniformity is expressed as the variability of the measurements about the mean This is expressed using the relative coefficient of variance (COV), which is the standard deviation divided by the mean and expressed as a percentage. The lower the COV value, the more uniform the velocity The acceptance criterion is that the COV of the air velocity must be ≤20% across the center two-thirds of the area of the stack

- Uniform Concentration of Tracer Gases – A uniform contaminant concentration in the sampling plane enables the extraction of samples that represent the true concentration This is first tested using a tracer gas The fan is a good mixer, so injecting the tracer downstream of the fan provides worst-case results Worst-case results are those that might be observed if the fan itself became contaminated and later released contaminants The acceptance criteria are that 1) the COV of the measured tracer gas concentration is ≤20% across the center two thirds of the sampling plane and 2) at no point in the sampling plane does the concentration vary from the mean by >30%

- Uniform Concentration of Tracer Particles – Uniformity in contaminant concentration at the sampling elevation is further demonstrated using tracer particles large enough to exhibit inertial effects Particles of 10μm aerodynamic diameter (AD) are used by default unless it is known that larger particles are present in the airstream The acceptance criterion is that the COV of particle concentration is ≤20% across the center two-thirds of the sampling plane

- Sample Extraction and Transport System Performance – The criteria are that 1) nozzle transmission ratio for a 10 μm AD particle is 0 8 to 1 3, 2) nozzle aspiration ratio for a 10μm AD particle is 0 8 to 1 5, and 3) the test particle penetration through transport system is ≥50% for 10 μm AD particles

3.3.2 Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents (ANSI N42.18)

The objective of continuously monitoring instrumentation is to measure the quantity and/or the rate of release of radionuclides in the effluent stream and to provide useful documentation for scientific and logical purposes This standard applies to continuous monitors that measure normal releases, detect inadvertent releases, show general trends, and annunciate radiation levels that have exceeded predetermined values This standard specifies detection capabilities, physical operating limits, reliability, calibration requirements, and sets minimum performance requirements for effluent monitoring

3.4 WASHINGTON STATE REGULATIONS

Applicable Washington State regulations are discussed in the following sections

3.4.1 General Regulations for Air Pollution Sources (WAC 173-400)

The purpose of this regulation is to establish technically feasible and reasonably attainable standards and to establish rules generally applicable to the control and/or prevention of emission of air contaminants

3.4.2 Air Operating Permit Program (WAC 173-401)

The Federal Clean Air Act (FCAA) of 1970 as expanded in 1990 contains several new requirements aimed at reducing the amount of airborne pollutants One of these requirements establishes a nationwide air operating permit program for particular sources of air pollution This program was intended to consolidate all of the source's air emission conditions and limitations into a single federally enforceable, state-issued permit Washington State implements the federal air operating permit program through Washington Administrative Code (WAC) 173-401

The Washington State, Department of Ecology (Ecology) is the permitting authority, and as such is responsible for issuing air operating permits However, due to the complexity of operations at the Hanford Site, Ecology established agreements with the Washington State, Department of Health (WDOH) for regulation of radioactive air emissions and with Benton Clean Air Authority (BCAA), for regulation of asbestos and open burning The U S. Environmental Protection Agency (EPA), Region 10, also has a presence in the Hanford Site Air Operating Permit (AOP)

The AOP was issued to the Department of Energy, Hanford Operations with an effective date of July 2, 2001 The following are identified with active Notice of Construction (NOC) approvals from the WDOH for Radioactive Air Emissions for operation at the PFP as documented in the AOP

- Plutonium Finishing Plant, Agitator/Sample Probe Repair (Tanks D-5 and D-8), 241-Z Building, DOE/RL-98-97, Permit ID· Regulatory Technical Assistance Meeting (RTAM), Issued February 23, 1999, Location 296-Z-3

- Plutonium Finishing Plant, Vertical Calciner, DOE/RL-96-62, Rev 0A, Permit ID AIR-01-710, July 18, 2001, Location· 291-Z-1

- Plutonium Finishing Plant, Duct Work and Process Piping Remediation, DOE/RL-95-97, Permit ID. AIR-02-1213, Issued December 13, 2002, Location 291-Z-1

- Plutonium Finishing Plant, Disposition of Select Plutonium-Bearing Alloys, DOE/RL-96-79 (Revisions 0G and 0H), Permit ID AIR 03-104, Issued January 10, 2003, Location 291-Z-1

- Plutonium Finishing Plant, Magnesium Hydroxide Precipitation Process, DOE/RL-99-77 (Revisions 0, 0A, 0B, 0C, 0D, 0E, 0F, and 0G), Permit ID AIR 01-1102, Issued November 8, 2001, Location. 291-Z-1

- Plutonium Finishing Plant, W-460 Plutonium Stabilization and Handling, DOE/RL-2000-42 (revisions 0, 2, 2A, 2B and 2C), Permit ID AIR-03-102, Issued January 9, 2003, Locations 296-Z-5, 296-Z-6 and 296-Z-7

- Plutonium Finishing Plant, Liquid Low-Level Waste Treatment Facility, AIR-02-1212, Issued December 31, 2002, Location 296-Z-15

- Plutonium Finishing Plant, Transition of the 232-Z Contaminated Waste Recovery Process Facility, AIR 03-902, Issued September 3, 2003, Location 296-Z-14

- Plutonium Finishing Plant, Stabilization/Deactivation/Demolition of Ancillary Buildings and Structures, DOE/RL-2002-32, Permit ID: AIR-02-807, Issued August 14, 2002, Locations Various

The 296-Z-3 Stack Notice of Construction "Radioactive Air Emissions Notice of Construction for Transition of the 241-Z Liquid Waste Treatment Facility at the Plutonium Finishing Plant, 200 West Area, Hanford Site, Richland, Washington" (DOE/RL-2002-72) was issued and approved in 2003 and is not listed in the AOP

The following is identified as having approval from Ecology for Nonradioactive Air Emissions Notice of Construction (NOC) for operation at the PFP as documented in the AOP:

- Nonradioactive Air Emissions Notice of Construction for the Thermal Stabilization of Polycubes at the Plutonium Finishing Plant, DOE/RL-2000-55, Approval Order No DE01NWP-001, Issued April 24, 2001 (Revision Form approved May 5, 2001)

3.4.3 Control for New Sources of Toxic Air Pollutants (WAC 173-460)

The purpose of this regulation is to establish the systematic control of new sources emitting toxic air pollutants (TAPs) in order to prevent air pollution, reduce emissions to the extent reasonable possible, and maintain such levels of air quality as will protect human health and safety.

3.4.4 Ambient Air Quality Standards and Emission Limits for Radionuclides (WAC 173-480)

Although the standard for Washington State establishes a 25-mrem per year (cumulative) dose limit for public exposure to radionuclides in the ambient air, facilities must comply with the most restrictive of federal, state, or local law Therefore, the exposure limit that must be complied with is the more restrictive 40 CFR 61 subpart H 10 mrem per year (EDE) EPA standard for the air pathway. Compliance is calculated for the nearest offsite receptor in an unrestricted area where any member of the public could be located (fence boundary).

3.4.5 Radiation Protection - Air Emissions (WAC 246-247)

This regulation specifies new source review, notification, registration, and permitting requirements associated with any source of radioactive air emissions in Washington State, including those on the Hanford Site. One specific requirement listed in WAC 246-247 is the semiannual reporting of emissions from each registered stack or vent onsite. By agreement with Washington State Department of Health, only annual reporting is required Although WAC 246-247 lists maximum EDE standards less stringent than the EPA radionuclide NESHAP standard, it contains a caveat stating that more stringent federal standards take precedence over the EDE standards specified by the WAC Therefore, it effectively endorses the 10 mrem per year EDE standard of 40 CFR 61, Subpart H, National Emission Standards for Hazardous Air Pollutants (NESHAP)

3.4.6 Water Quality Standards for Groundwater (WAC 173-200)

The water quality standards to protect groundwater to the level of drinking water standards are contained in *Water Quality Standards for Groundwater of the State of Washington* (WAC 173-200) These standards limit exposure to gross alpha, gross beta, tritium, strontium-90, radium-226,and -228 For radionuclides that are not listed specifically, exposures are limited by the federal standard to an EDE not to exceed 4 mrem per year

3.4.7 State Waste Discharge Permit Program (WAC 173-216)

The purpose of this regulation is to implement a state permit program, applicable to the discharge of waste materials from industrial operations into ground and surface waters of the state However, this regulation excludes point source discharge of pollutants into navigable waters of the state, which is regulated by the *National Pollutant Discharge Elimination System Permit Program* (WAC 173-220) This regulation also excludes the injection of fluid through wells, which is regulated by *Underground Injection Control Program* (WAC 173-218)

3.4.8 Dangerous Waste Regulations (WAC 173-303)

Any release of a dangerous or hazardous substance (as designated by WAC) to the environment, except permitted releases, must be reported. Waste streams that have the potential to contain dangerous waste constituents must be monitored accordingly

3.5 LOCAL REGULATIONS

At the local level, EPA designated the Benton Clean Air Authority with responsibility to oversee and enforce EPA asbestos regulations under the National Emission Standards for Hazardous Air Pollutants (40 CFR, Subpart M) In addition, the Benton Clean Air Authority regulates open burning, as an extension of the Washington State Department of Ecology's open burning requirements (WAC 173-425) In both areas of responsibility, the Benton Clean air Authority enforces/adopts the federal and/or state regulations by reference, as well as imposes additional requirements on sources such as the Hanford Site from the local agency level

Table 3-1 Requirements Matrix.

Agency/originator	Regulation, standard, or permit	Applicable to facility	Summary/application
U S DOE, Washington, D C	DOE Order 450 1, *Environmental Protection Program*	X	Provides general environmental protection standards
	DOE Order 5400 5, *Radiation Protection of the Public and Environment*	X	Sets radioactive release standards for the public and environment (dose limits)
	DOE Order 435 1, *Radioactive Waste Management*	X	Sets radioactive waste management requirements (10 CFR 835 requires monitoring for outdoor contamination near facility)
	DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*	X	Provides guidance for effluent sampling and monitoring
U S EPA, Washington, D C	40 CFR 60, "Standards of Performance for New Stationary Sources"	X	Establishes monitoring requirements for air pollutants
	40 CFR 61, National Emission Standards for Hazardous Air Pollutants (NESHAPs)	X	Sets NESHAPs for hazardous air pollutants (including radionuclides – Subpart H)
	40 CFR 70, "State Operating Permit Program"	X	Requires state air operating permit programs (i e , WAC 173-401)
	40 CFR 261, "Identification and Listing of Hazardous Waste"	X	Identifies and lists hazardous wastes
	40 CFR 302, "Designation, Reportable Quantities, and Notification"	X	Identifies the allowable release limits of hazardous and radioactive constituents
ANSI, New York, NY	N 13 1*, "Guidance to Sampling Airborne Radioactive Materials in Nuclear Facilities"	X	Sets standards for effluent monitoring systems
	N 42 18*, "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents"	X	Recommendations for the selection of instrumentation for the monitoring of radioactive effluents
	ANSI N323, "Radiation Protection Instrumentation Test and Calibration"	X	Sets standards for calibration of radiation detection instrumentation, such as CAMs
Washington State Department of Ecology, Olympia, WA	WAC 173-216, "State Waste Discharge Permit Program"	X	Governs discharges to ground and surface waters
	WAC 173-220, "National Pollutant Discharge Elimination System Permit (NPDES)"	N/A	Governs wastewater discharges to navigable waterways, controls NPDES permit process
	WAC 173-303, "Dangerous Waste Regulations"	X	Regulates dangerous wastes, prohibits direct release to soil columns
	WAC 173-400, "General Regulations for Air Pollution Sources"	X	Sets emissions standards for hazardous air pollutants
	WAC 173-401, "Air Operating Permit Program"	X	Establishes an operating permit for hazardous (regulated) air pollutants, including radionuclides
	WAC 173-460, "Control for New Sources of Toxic Air Pollutants"	X	Sets standards or new sources of toxic air pollutants
	WAC 173-480, "Washington State Ambient Air Quality Standard and Emission Limits for Radionuclides"	X	Endorses the 10 mrem/year EDE-EPA standards (40 CFR 61, Subpart H)
Washington State Department of Health, Olympia, WA	WAC 246-247, "Radiation Protection – Air Emissions"	X	Sets standards for registration, permitting, notification, new sources, review, monitoring, and reports
	"Notice of Construction"	X	If Applicable
Benton Clean Air Authority, Richland, WA	Regulation 1	X	Regulates air quality regarding compliance with 40 CFR 61,Subpart M, for asbestos and open burning

EDE = effective dose equivalent

N/A = not applicable

*Referenced in DOE Orders and EPA regulations

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4.0 IDENTIFICATION AND CHARACTERIZATION OF EFFLUENT STREAMS

Both liquid and gaseous effluent streams exist at PFP. This section describes each identified effluent stream that meets the FEMP criteria The primary focus is placed on the 291-Z-1, 296-Z-3 and 296-Z-7 Stack air effluents, which are currently the only PFP sources exceeding the FEMP preparation criteria

4.1 LIQUID EFFLUENT STREAMS

Many of the liquid streams, identified in WHC-EP-0440 as having a potential for creating a contamination release have been eliminated as sources This effectively has eliminated the single liquid stream identified as 216-Z-20 from the original list of liquid effluents requiring a FEMP Furthermore, the effluents discharged to the French drains are not contaminated. French drains are being managed as discussed in DOE/RL-96-40 "Miscellaneous Streams Best Management Practice Report". The PFP east and west sanitary sewer lines were modified to form a common discharge to the Washington State permitted 2607-W1 tile field The east and west tile fields are inactive and abandoned The 216-Z-13 French drain is isolated from its source and is no longer a soil column discharge point

None of the following liquid streams meet the FEMP preparation criteria

- 200 Area TEDF effluent (formerly 216-Z-20 crib and 216-Z-21 seepage basin)
- East tile field [sanitary sewer line (inactive)]
- West tile field [sanitary sewer line (inactive)]
- French drains

Table 4-1 summarizes the constitution of each liquid effluent stream and describes the streams and the associated facilities

Historically, PFP had a potential to exceed the derived concentration guide (DCG) for total alpha in some of these liquid effluent streams. Implementation of Best Available Technology/All Known A Reasonable Technology (BAT/AKART) through closed-loop cooling systems, startup of the low-level waste treatment facility (LLWTF) and the 200 Area Treated Effluent Disposal Facility (TEDF) greatly has reduced this potential The LLWTF treats PFP liquid effluents before discharge to the 200 Area TEDF The TEDF Interface Control Document (HNF-SD-W049H-ICD-001, Rev 7) requires sampling and analyses for indicator parameters (total alpha, total beta, anions, heavy metals and total dissolved solids) and expanded parameters (semi-volatile and volatile organic compounds) to ensure that PFP does not discharge liquid waste that exceeds the 200 Area TEDF acceptance criteria

The PFP liquid effluent stream previously identified by the discharge point 216-Z-20 Crib, was isolated from the crib and tied into the 200 Area TEDF on May 22, 1995 The FEMP determination report (WHC-EP-0440) concluded this stream required a FEMP based on the radioactive discharge potential Following TEDF tie-in, this stream's potential was re-evaluated. The FEMP determination report for TEDF (WHC Correspondence 018C0-95-036) concluded that a FEMP was not required for the TEDF effluent stream, and thus also not required for 216-Z-20

Additional effluent streams were originally designated in WHC-EP-0440 as requiring a FEMP· the 216-Z-13, 216-Z-14, and the 216-Z-15 French drains for the 291-Z Building, and the 2734-ZL heating, ventilation, and air conditioning (HVAC) exhaust for the 2734-ZL Building. The French drains were re-evaluated as not requiring a FEMP (WHC-EP-0476), based on the availability of more detailed information on the potential source term. The 2734-ZL Building was re-evaluated as not requiring a FEMP, based on the permanent removal of the source term from the building

4.2 GASEOUS EFFLUENT STREAMS

The 291-Z-1, 296-Z-3 and 296-Z-7 Stacks meet the criteria requiring the preparation of a FEMP Table 4-2 summarizes the constituents of each gaseous effluent stream and describes each stream and the associated facilities The main existing gaseous effluent streams from PFP are as follows.

- 291-Z-1 Main Stack
- 296-Z-3 Stack for the 241-Z Building
- 296-Z-5 Stack for the 2736-ZB Buildings
- 296-Z-6 Stack for the 2736-Z Building
- 296-Z-7 Stack for the 2736-ZB Building
- 296-Z-14 Stack for the 232-Z Building
- 296-Z-15 Stack for the 243-Z Building

The following sections describes the source terms that actually or potentially contribute to the PFP effluent streams during routine or upset operating conditions. Details are provided only for those streams for which the FEMP criteria were determined to be exceeded (WHC-EP-0440), the 296-Z-7 stack (constructed after the publishing date of WHC-EP-440) and the 296-Z-3 stack

4.3 291-Z-1 MAIN STACK ROUTINE OPERATING CONDITIONS

Seven major systems contribute to this effluent stream

- 234-5Z Building E-3 (Zone 3) exhaust system
- 234-5Z Building E-4 (Zone 4) exhaust system
- Process solution transfer vacuum exhaust
- PFP air sampling vacuum exhaust system
- 236-Z Building E-3 exhaust system
- 236-Z Building E-4 exhaust system
- 236-Z Building air sampling vacuum system

These systems include exhaust from areas that have a slight potential for radioactive contamination (designated as "Zone 3" areas) or are potentially contaminated or known to be contaminated (designated as "Zone 4" areas).

Stack 291-Z-1 released 6 4 E-05 curies of plutonium-239/240 in calendar year 2002 which contributed 9.6 E-05 mrem EDE to the Hanford Site MEI or approximately 0 42 percent of the Hanford Site total MEI dose of 0 023 mrem The average 291-Z-1 Stack flow rate was 250,000 cubic feet per minute with a standard deviation of 4 percent

4.4 296-Z-3 STACK ROUTINE OPERATING CONDITIONS

The 296-Z-3 stack ventilates the 241-Z Building. Routine operations associated with building transition include receipt and transfer of liquid waste, flushing and sampling liquid waste systems, decontamination and removal of equipment from hot cells, size reduction and removal of equipment.

Stack 296-Z-3 released 2.8 E-08 curies of plutonium-239/240, 1.5 E-08 curies of americium-241 in calendar year 2002 which contributed approximately 6.0 E-08 mrem EDE to the Hanford Site MEI or approximately <0.0001 percent of the Hanford Site total MEI dose of 0.023 mrem. Stack 296-Z-3 ventilates an exhaust flow of approximately 580 cubic feet per minute.

4.5 296-Z-7 STACK ROUTINE OPERATING CONDITIONS

Stack 296-Z-7 ventilates stabilization and packaging equipment operations in building 2736-ZB. Project W-460 installed nitrogen supplied ventilated gloveboxes in building 2736-ZB. The nitrogen flow is HEPA-filtered prior to entry into the glovebox to avoid contamination releases in the event of a flow reversal. The gloveboxes are provided with an emergency actuated room inlet HEPA filter to prevent excess vacuum from occurring. The glovebox exhaust stream is HEPA-filtered prior to entering the facility ventilation ductwork to minimize contamination spread and facilitate eventual decommissioning and decontamination operations. The 2736-ZB glovebox exhaust stream is routed to Room 641B HEPA filter station. Room 641B contains two parallel, redundant, two-stage HEPA trains, with two filters at each station (8 filters total) for maximum air cleaning efficiency and redundancy. These filters are seismically qualified to current Hanford Site design standards (HNF-PRO-097). Filter loading is monitored by redundant differential pressure switches on each filter bank. Stack 296-Z-7 is located outside of 2736-ZB, powered by two new, redundant exhaust fans, and monitored with a Continuous Air Monitor (CAM) and record sample.

Stack 296-Z-7 released 6.0 E-10 curies of plutonium-239/240 in calendar year 2002 which contributed 7.3 E-10 mrem EDE to the Hanford Site MEI or approximately <0.0001 percent of the Hanford Site total MEI dose of 0.023 mrem. Stack 296-Z-7 ventilates an exhaust flow of approximately 300 - 1,800 cubic feet per minute.

4.6 291-Z-1 MAIN STACK UPSET OPERATING CONDITIONS

The most recent upset condition to occur at PFP involved the May 14, 1997 pressurization of a chemical makeup tank in the PRF that resulted in a violent rupturing of the tank. Emissions of nitrogen oxides were estimated (given the quantity of chemicals in the tank) to be 35 pounds via the 291-Z-1 Stack. Before this event, the most significant upset release occurred in 1986, when hydrogen fluoride damaged a HEPA filter bank. Hydrogen fluoride is no longer used in current PFP operations. No other significant upset releases have been identified that could affect the postulated release scenarios for upset conditions.

Other releases identified due to upset conditions would be small amounts of various chemicals from incidental material spills or equipment failure.

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Table 4-1. Plutonium Finishing Plant Complex Liquid Effluent Streams

Discharge designation	Facilities serviced	Liquid waste description	Hazardous chemical content	Radioactive material content	Comments*
200 Area TEDF	234-5Z, 291-Z, 236-Z, 2736-ZB	Condensates, air condition systems, storm drains, etc	Normally uncontaminated	Normally uncontaminated (^{90}Sr, ^{137}Cs, ^{238}Pu, ^{239}Pu, ^{241}Pu, ^{241}Am)	No radioactive or hazardous release potential

* Details are provided in WHC-EP-0440

Table 4-2 Plutonium Finishing Plant Complex Gaseous Effluent Streams.

Discharge Designation	Facilities serviced	Gaseous effluent description	Hazardous material content	Radioactive material content	Comments[1]
234-5Z Building Zone 1 exhausts	234-5Z	Exhaust from building 'clean' areas	None	None	No hazardous potential
291-Z-1 Main Stack	234-5Z, 236-Z, 242-Z	Main filtered effluent discharge	NOx, HCl, acetone trace quantities	Pu and associated radionuclides	Hazardous potential
296-Z-3 Stack	241-Z	Building exhaust	NOx trace quantities	Pu and associated radionuclides	Low hazardous potential[2]
296-Z-5 Stack	2736-ZB	Building exhaust	None	Pu and associated radionuclides	Extremely low hazardous potential
296-Z-6 Stack	2736-Z	Storage vault exhaust	None	Pu and associated radionuclides	Extremely low hazardous potential
296-Z-7 Stack[2]	2736-ZB	Plutonium stabilization and handling	None	Pu and associated radionuclides	Low hazardous potential[3]
296-Z-14 Stack	232-Z	Incinerator exhaust	None	Pu and associated radionuclides	Extremely low hazardous potential
296-Z-15 Stack	243-Z	Low-Level Waste Treatment Facility	None	Pu and associated radionuclides	Extremely low hazardous potential[2]

[1] Details are provided in WHC-EP-0440

[2] This stack was re-designated as a major stack after WCH-EP-0440 was issued Therefore, the effluent data are taken from recent published reports and a project notice of construction

[3] This stack became operational after WHC-EP-0440 was issued Therefore, the effluent data are taken from recent published reports and a stack assessment

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5.0 EFFLUENT POINT OF DISCHARGE DESCRIPTION

This section characterizes the effluent discharge points within PFP for those effluent streams exceeding the criteria for requiring a FEMP. This characterization includes the identification of all contributing streams, physical dimensions, identification of any monitoring systems, flow rates, and other pertinent information Information on the streams that did not exceed the criteria was documented in WHC-EP-0440

5.1 TEDF DISCHARGE

200 Area TEDF is a permitted water discharge facility located in the 200 East Area 200 Area TEDF consists of a monitoring and sampling facility and a 6-acre evaporative/percolation pond 200 Area TEDF receives wastewater from facilities in the 200 Areas. All facilities in the 200 Areas have implemented BAT/AKART as required under the WAC 173-216 Discharge Permit Each facility conducts monitoring and sampling before discharging to the 200 Area TEDF piping network.

The discharge from PFP to the 200 Area TEDF is made up of three separate streams that combine to constitute the total discharge The water collected by the transport system flows through a series of pipes and septic/sewer covers and the 225-WC Sampling Facility to the 200 Area TEDF pump station where water is pumped to the 200 East Area for disposal The three separate streams that combine to make up the total discharge are (1) effluent from the LLWTF, (2) roof drains on the 234-5Z Building and backside storm drains, and (3) front side steam condensate and HVAC cooling water Operations and facilities serviced by this system include 234-5Z, the Analytical Laboratory in 234-5Z, the Development Laboratory in 234-5Z, and the 236-Z and 291-Z Buildings Maintenance covers, numbered Z-1 through Z-4, Z-7, C-1 through C-4, and S-1 through S-7, are located along the stream route to the interface point of PFP and 200 Area TEDF (refer to Figure 5 1)

The LLWTF receives wastewater from maintenance cover Z-4 The sources of water to Z-4 include 234-5Z, the 234-5Z Engineering Laboratory, the 234-5Z Development Laboratory, 236-Z, and the 291-Z Exhaust Air Stack Building The 232-Z and 242-Z Buildings have all drain lines plugged and water sources shut off, except for fire service water

The 234-5Z roof drains and storm drains collect at maintenance covers Z-1 and Z-2 HVAC condensate water also is received from the 2736-ZB Building at Z-1. The wastewater collected by this system flows to Z-7, where the wastewater combines with the effluent from the LLWTF

The front side steam condensate and HVAC cooling water joins the combined stream at C-2. The major contributor to this effluent is the steam condensate and spray pan water overflow from the 234-5Z Building supply fans.

The nominal flow rate for this system is approximately 30 gallons per minute with an allowable rate of 700 gallons per minute As mentioned previously, the interface point between PFP and 200 Area TEDF is the 225-WC Sampling Facility The maintenance covers serve as locations for obtaining grab samples of any stream flowing into each maintenance cover Grab samples also can be taken from the LLWTF, which has composite samplers on the inlet and outlet to the facility stream Grab samples can be collected periodically as a backup to the record sampling system or for special analysis of the stream constituents

5.2 291-Z-1 MAIN STACK

The PFP Main Stack, constructed of reinforced concrete, is 200 feet tall with an inside diameter of 16 5 feet at the base and 13 5 feet at the top The stack exhausts filtered process and ventilation air from gloveboxes and hoods in the 234-5Z, 236-Z, and 242-Z Buildings, and from those rooms that have a slight potential for contamination Systems that contribute to this effluent stream include the 234-5Z Building E-3 and E-4 exhaust and process solution transfer vacuum exhaust, the PFP air sampling vacuum exhaust system, and the 236-Z Building E-3 and E-4 exhaust and air sampling vacuum exhaust systems Depending on the source, air passes through from one to three testable stages of HEPA filtration before entering the stack The stack is equipped with an air sampling probe located at the 50-foot level of the stack The probe feeds a record sampler and an alpha continuous air monitor (CAM) with an alarm

The E-3 air comes from rooms and corridors in the 234-5Z Building The E-3 air is routed to the E-3 filter manifold and filtered through a single stage of testable high-efficiency particulate air (HEPA) filters, with a minimum efficiency of 99 95 percent for particles with a median diameter of 0 3 micron There are seven E-3 Filter Rooms (Rooms 311 through 316 and 318). The E-4 air comes from open-faced hoods and gloveboxes. The air is then routed to the first stage of testable HEPA filters (two stages exist but credit is taken for only one stage) which are located on the duct level or second floor of the 234-5Z Building Exhaust air from these filters enters a manifold and is then routed to the E-4 Filter Rooms (Rooms 309 and 310). Downstream of the filter rooms, E-4 exhaust is combined with E-3 exhaust in the stack manifold and then discharged to the atmosphere via the 291-Z-1 Stack.

The flow rate from the stack averages approximately 250,000 cubic feet per minute as determined by ventilation and balance personnel Four of seven exhaust fans operate at any one time, with the remaining three as standby plus two steam-driven turbines for power-loss emergency operation

5.3 296-Z-3 STACK

The 296-Z-3 stack exhausts filtered air from transition activities in the 241-Z complex of buildings The 241-Z Building started operations in 1949 to provide PFP with the capability to treat, store, and dispose of liquid waste. The facility includes a buried, reinforced concrete structure with a sheet metal enclosure over the top The enclosure houses a small hoist for removing cell covers and equipment and provides weather protection The enclosure is not serviced by the facility ventilation system The 241-Z Building is approximately 6 meters (20 feet) wide, 28 meters (92 feet) long, and 7 meters (22 feet) deep, and is located approximately 100 meters (330 feet) south of the 234-5Z Building The below grade tank vaults are posted as airborne radiation areas

At the southwest corner of the 241-Z Building vault deck is the equipment for the 241-Z vessel vent filters and vault ventilation system (initially installed in 1964, and modified to current configuration in 1979) The 296-Z-3 stack is 7 2 meters (24 feet) high and 0 36 (14 inches) in diameter. The 296-Z-3 stack fans and associated controls are located on a 4 2 meters (14 feet) by 5 4 meters (18 feet) concrete pad The 241-Z Building also consists of the 241-ZA Sampling Building and the 241-ZG Change Room. The sampling glovebox in 241-ZA Sampling Building is interconnected to the 241-Z cell exhaust system by ventilation piping and a drain line. Next to the 241-ZA Sampling Building is the 241-ZB Bulk Chemical Storage area containing the D-9 tank The D-9 tank is connected to he 241-Z ventilation system Neither the 241-ZA Sampling Building nor the Bulk Chemical Storage areas have controlled ventilation

5.4 296-Z-7 STACK

The 296-Z-7 Stack exhausts filtered air from stabilization and packaging activities conducted in the PFP 2736-ZB building The stack began operating in November 2001 The stabilization and packaging activities are conducted predominantly in Rooms 642 and 641 The total exhaust air flow should normally be about 1550 – 1800 cfm. The ventilation flow is powered by one or two fans located next to the 296-Z-7 stack All exhaust air is filtered with two stages of HEPA filtration with a minimum efficiency of 99 95 percent for particles with a median diameter of 0 3 micron

The stack has an internal diameter of 15 25 inches and is about 50 feet tall The approximate number of stack diameters from the top of the stack breach to the sampling nozzle and the test ports is 12 4

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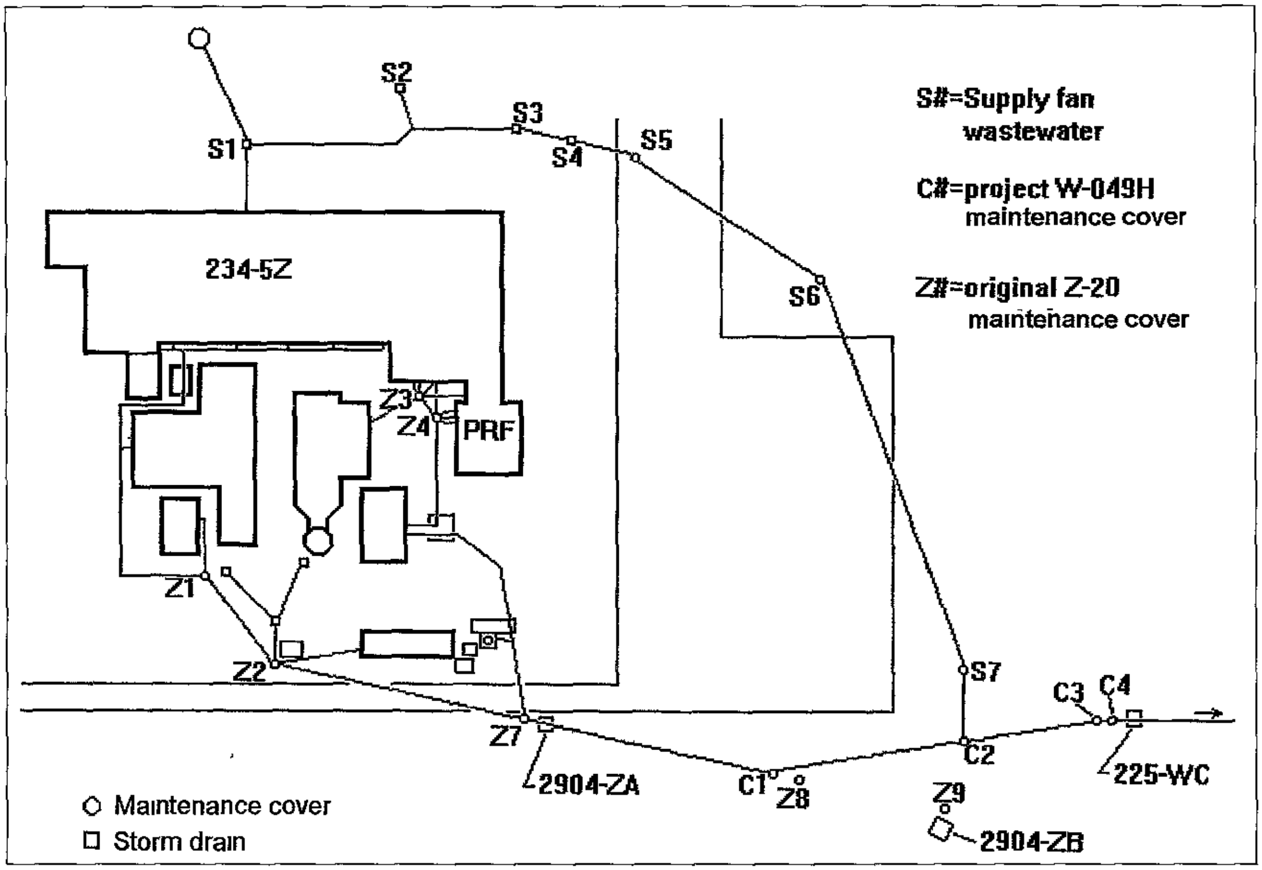

Figure 5-1 Plan and Overall Piping Schematic for the 200 Area TEDF Effluent Stream.

Figure 5-2 291-Z-1 Stack Sampling Instrument Building

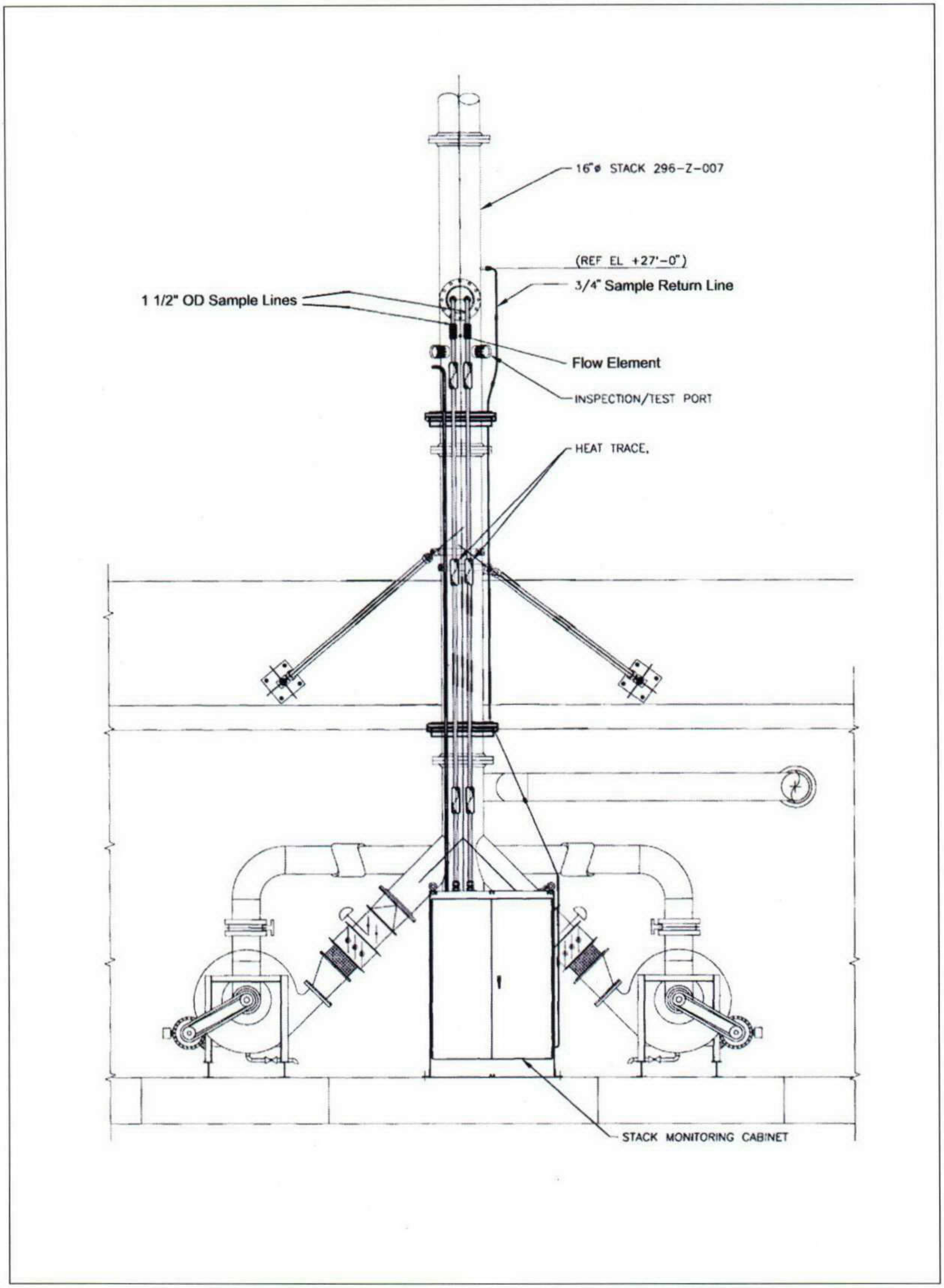

Figure 5-3 296-Z-7 Ventilation Exhaust Stack.

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6.0 EFFLUENT MONITORING/SAMPLING SYSTEM DESIGN CRITERIA

This section presents design criteria for both liquid and gaseous effluent monitoring systems These include criteria contained in federal regulations including DOE Order 5400 5, DOE/EH-0173T and design criteria used by the contractor to ensure compliance with the regulations and 200 Area TEDF State Waste Discharge Permit requirements

The design criteria pertaining to the PFP stack effluent CAM systems are contained in ANSI N42 18. The design criteria pertaining to the record sampling systems include ANSI N13.1 – 1969 and ANSI/HPS N13 1 – 1999.

6.1 LIQUID EFFLUENTS

DOE has maintained that the release of liquid radioactive materials is governed by the *Atomic Energy Act of 1954* and that the release limits set by DOE correspond to federally permitted releases and are thus exempt from other federal and state regulations At the same time, DOE has committed to complying with all 'applicable' limits of EPA and state regulations

DOE Order 5400 5 provides guidance on the acceptable levels of radioactivity that are allowed in liquid waste and effluents The purpose of the DOE Orders is to ensure that the dose to the public remains below 100 mrem per year and protects the environment

Demonstration of compliance with DOE Order 5400.5 is based on data from monitoring and surveillance programs DOE Order 5400 5 states that liquid effluents from DOE activities shall not cause private or public drinking water systems downstream of the facility discharge to exceed the drinking water limits in 40 CFR 141 There is no guidance given on how to achieve that goal with regard to allowed concentrations in the facility liquid effluent

The following guidance is provided in Chapter II, Section 3 of DOE Order 5400 5, for surface discharges

- Discharges greater than DCG values on an annual average would require a BAT be applied
- Discharges at less than DCG do not require implementation of a BAT.
- The settable solids in any liquid effluent stream cannot exceed 5 picocuries per gram alpha or 50 picocuries per gram beta
- Interim dose limits for native aquatic animal organisms cannot exceed 1 radiation absorbed dose per day

Guidance on discharges of liquid waste to aquifers and phase out of soil columns are found in DOE Order 5400.5, Chapter II, 3 b The guidance is limited to a re-affirmation of the DOE commitment to phase out soil column use (i.e , trenches, cribs, ponds, and drain fields). In addition, new or increased discharges of radionuclides in liquid waste to soil columns is prohibited (Chapter II, 3 b[2]) unless DOE activity cannot comply or the release is tritium (Chapter II, 3 e[1]).

Compliance with the dose limits of DOE Order 5400 5 are demonstrated by documentation of an appropriate combination of measurements and calculation The ALARA concept in DOE Order 5400 5 is to attain dose levels as low as technically and economically feasible. Compliance with these two objectives would seem to require monitoring any stream with the potential for containing measurable radioactivity.

6.2 GASEOUS EFFLUENTS

Specific criteria for upgrading the major (potential EDE exceeding 0 1 mrem per year) Stacks on the Hanford Site to meet recent regulations were documented in the NESHAPs Federal Facility Compliance Agreement (FFCA) (DSI 9401181) These criteria were intended to be used for upgrading sampler-monitor systems on selected stacks The 291-Z-1 Main Stack was included as a major Stack and meets the criteria identified in the NESHAPs FFCA Later, the 296-Z-7 Stack was constructed as a major stack and the 241-Z Transition Project changed the designation of the 296-Z-3 Stack to a major stack

Generally, ANSI N13 1- 1969 continues to serve as the primary source of detailed requirements for effluent monitoring systems at PFP Therefore, comparison of the existing stack monitoring systems to these design criteria is made in Section 14 0 of this FEMP

The following general design and performance criteria are applicable to all radioactive gaseous effluent streams at PFP Further detail is provided in HNF-RD-15332 "Environmental Protection Requirements", HNF-PRO-15333 "Environmental Protection Processes" and HNF-PRO-15334 "Effluent and Environmental Monitoring". In Section 7.0 of this FEMP, the effluent monitoring system instrumentation is described in detail. This information was used to demonstrate compliance with both the criteria and applicable regulations in Section 14 0 of this FEMP

- Continuous sampling is provided for all gaseous effluents that have the potential to exceed 0.1 mrem per year EDE to the offsite individual 40 CFR 61 Subpart H requirements are satisfied with the record sample system For sources with a potential less than or equal to 0.1 mrem per year, periodic confirmatory sampling is performed (Basis 40 CFR 61 93)

- Annual inspections and cleaning (if necessary) of sample probes and transport lines are conducted

- Annual leak tests are conducted of the sample transport lines

- CAM and alarm systems are provided for PFP stack systems 40 CFR 61, Subpart H does not require CAMs on stacks CAMs are primarily driven by DOE requirements

- Audible and visible alarm indications easily are discernible to responsible personnel in continuously or frequently occupied spaces.

- Monitoring system alarms are set at release concentrations as low as possible without resulting in an excessive number of false alarms because of normal fluctuations in emissions or background radiation levels

- Air monitoring systems are calibrated according to ANSI N323 and ANSI N42 18 when installed and anytime the systems are subject to maintenance or modification.

- Air monitoring systems are powered from a source that has the same or equivalent back-up capability as the air mover for the effluent stream being monitored
- Air monitoring systems are inspected daily and source-checked monthly.
- Analytical methods for continuous monitoring of effluents are in accordance with applicable EPA methods for the contaminants specified by the EPA Alternate methods are used where approved EPA methods are not specified

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7.0 CHARACTERIZATION OF CURRENT EFFLUENT MONITORING SYSTEM

This section characterizes the existing effluent monitoring systems for those effluent discharge points previously determined to require a FEMP (the 291-Z-1 Main Stack, the 296-Z-3 Stack and the 296-Z-7 stack) These characterizations include a description of the instrumentation and any applicable technical specifications or operational safety requirements.

Operability surveillance of the monitoring and sampling equipment is performed each shift for all PFP stack monitoring and sampling systems. When routine sample exchanges are required (typically every 2 weeks), both surveillance and exchange inspections are performed. In the event of a vacuum pump failure, facility craft personnel replace the failed pump and restore the system to an operable status.

Functional testing of the 291-Z-1, 296-Z-3 and the 296-Z-7-stack sampler and monitoring system components are performed monthly and annual calibrations are performed. Those components that are part of the calibration cycle include the CAM, vacuum gauges, vacuum switches, rotameters, and the flow totalizer. Components involved in the functional testing cycle include the CAM, vacuum switches, rotameters, and totalizer Recall of components for preventative maintenance action is accomplished by the PFP Preventative Maintenance and Surveillance system The PFP system can be used to facilitate recall of historical records of maintenance performed as required.

7.1 INSTRUMENTATION DESCRIPTION

This section contains detailed descriptions of the effluent monitoring instrumentation for the 291-Z-1 Stack, the 296-Z-3 Stack and the 296-Z-7 stack These descriptions and the design criteria presented in Section 6 0 are used in this FEMP to determine compliance with applicable regulations

7.1.1 291-Z-1 Main Stack

The 291-Z-1 stack exhausts filtered process and ventilation air from gloveboxes and hoods in the 234-5Z, the 236-Z and the 242-Z Buildings, and from those rooms that have a potential for contamination Systems that contribute to this effluent stream include the 234-5Z Building E-3 and E-4 exhaust and process solution transfer vacuum exhaust, the PFP air sampling vacuum exhaust system, and the 236-Z Building E-3 and E-4 exhaust and air sampling vacuum exhaust systems Depending on the source, air passes through from one to three testable stages of HEPA filtration before entering the stack. The stack is equipped with an air sampling probe located at the 50-foot level of the stack The probe feeds a record sampler and an alpha continuous air monitor (CAM) with an alarm

7.1.1.1 Sample probe

The stack probe supplies air to both a record sampler and an alpha CAM with an alarm The probe extracts stack air for sampling at the 50-foot level of the 200 foot high stack Once extracted, the sample air passes through a short transport line followed by a flow splitter and is divided into two equal parts: the record sample loop and the CAM loop

A new air sampling shrouded probe system was installed in the 291-Z-1 stack in May 2002 (see drawing H-2-28364), which is used for continuous sampling of particulate matter from the stack (see figure 7-1) The stack's gas flows into the entrance of the shroud where it is decelerated to a velocity of about one-quarter that of the free stream in the stack. The inner nozzle samples the center core of the gas that enters the shroud and the rest of the gas is exhausted at the rear of the shroud through the annular gap between the shroud and the inner nozzle. The deceleration process at the shroud inlet causes aerosol enrichment in the region near the shroud wall, but the inner nozzle does not sample that aerosol The core flow is not appreciably enriched so the inner nozzle samples gas that has nearly the same aerosol particle concentration as the free stream A graph of the record sample total alpha results before and after the shrouded probe installation is shown in figure 7-2

The annual sample probe inspection conducted in November 2003 (as required per 40 CFR 61, Subpart H, Appendix B Method 114 Table 2 "Maintenance, calibrations and field check requirements") revealed no internal visible deposits and sample system cleaning was not required

7.1.1.2 Sample Transport Line

The stack sample transport line extends approximately 1 meter horizontally from the stack surface connection flange to the monitoring instruments located within the instrument cabinet at the 50-foot level The stack sampling instrument cabinet is located outside of the stack at the 50-foot level. This arrangement facilitates the use of a straight, short sampling line, thus minimizing horizontal length and potential particulate losses in the sampling line Line losses associated with the record sampler have been estimated at 5 percent with filter losses contributing an estimated 9 percent This represents a total overall correction factor of 0.86

When the new shrouded probe was installed in May 2002, the existing 291-Z-1 stack sample probe and transport line was removed and destructively analyzed for accumulated deposits See section 7 1 1 6 for more information

The annual sample transport line leak test (as required per 40 CFR 61, Subpart H, Appendix B Method 114 Table 2 "Maintenance, calibrations and field check requirements") was conducted in November 2003 The transport line met the acceptance criteria of a leakage rate not greater than 5% flow at typical operating pressures

7.1.1.3 Record Sampler

The record sampler is a particulate filter holder located in the instrument cabinet at the 50-foot level One leg of the stack sample line exiting the flow splitter directs airflow to the record sampler assembly at a nominal rate of 2 cubic feet per minute. The record sampler is a 47-millimeter in-line fixed sample holder and is located approximately 8 inches after the splitter The sampler assembly holds a particulate membrane filter with a collection efficiency rated by the manufacturer at not less than 91 percent for a 0 3 micro-meter diameter aerosol In 1991, the membrane filter manufacturer tested 24 samples for collection efficiency with a 0.3 micro-meter di-octyl phthalate aerosol The measured average efficiency was 95 8%. ANSI N13 1 – 1999 lists the collection efficiency of these membrane filters at 99.7% to >99 9%

The record sample air passes through a flow totalizer that measures total flow in increments of 0 1 cubic meter The sample air then travels through a vacuum gauge, an adjustable vacuum switch, and an oil-less pump regulated by a flow regulator. The vacuum switch monitors the vacuum in the line and triggers an alarm when pressure outside of a specified range occurs, indicating a loss of flow The sample air is routed back into the stack The record samples are collected for later off-line analyses at the WSCF analytical laboratory. The record sampler/flow totalizer system allows radionuclide discharge concentrations to be determined and provides the basis for release calculations and reporting.

7.1.1.4 Continuous Air Monitor

The other leg of the sample line exiting the splitter leads to a CAM. The CAM loop collects particulate matter in a fashion similar to that of the record sampler, but the CAM monitors for elevated radioactivity on the filter This instrument also provides backup capability for the record sampler The CAM is calibrated annually by Pacific Northwest National Laboratory (PNNL) The airflow through the CAM is maintained at approximately 2 cubic feet per minute The CAM is equipped with alarms indicating high radiation levels or inoperability The vacuum system serving the CAM is similar to that serving the record sampler except that there is no flow totalizer and the rotameter is an integrated CAM component

7.1.1.5 Instrument Cabinet

Effluent monitoring equipment is located in the instrument cabinet (2712-Z Building) adjacent to the stack at the 50-foot level The items contained in the instrument cabinet includes the following:

- Incoming sample line
- Flow splitter
- Record sample holder
- Two rotameters
- Two vacuum gauges
- Vacuum lines
- Two flow regulators
- Exhaust line routed back into the stack
- Alpha CAM
- Flow totalizer
- Two vacuum switches
- Two centrifugal type pumps
- Alarm relay panel

Inside the instrument cabinet, a baseboard heater heats the sample transport line to inhibit condensation by maintaining the temperature above the dew point

7.1.1.6 Co-Sampling Evaluation of Record Sampler

Prior to installing the shrouded probe in May 2002, a co-sampling test was performed to evaluate the performance of the existing 291-Z-1 stack sampling probe, a multi-nozzle "rake" designed to ANSI N13 1 -1969 standards The co-sampling test consisted of installing and operating an ANSI N13 1 -1999 shrouded probe side by side with the existing stack sampling system (see figure 7-3) The test duration extended from March 2001 to March 2002 for 27 bi-weekly sample exchange periods (54 weeks total).

The temporary co-sampler consisted of an open face filter holder with an attached shrouded probe (see figure 7-4) The entire shrouded probe open face filter holder assembly was placed directly into the 291-Z-1 stack air stream thereby eliminating any source of line loss The shrouded co-sampler filter papers were installed, operated and exchanged on a schedule identical to the existing stack samples A comparison of total alpha results for both samplers is shown in figure 7-5. The two samplers demonstrated no statistical difference in stack sampling data at the 99% confidence level Actual total alpha data for the entire duration of the co-sampling evaluation are contained in table 7-1

Destructive analyses were performed on the existing ANSI N13 1 – 1969 sample probe and transport line when they were removed in preparation for the shrouded probe installation. The probe and transport line were cut into smaller sections and shipped to the 222-S laboratory for analyses Each probe and line section was rinsed with mild nitric acid solution and the collected rinse was then analyzed for radionuclide content The resulting measurements represent approximately 24 years of accumulated sample line deposition and are as follows: 0 65 grams of mass; 0 11 μCi of Pu-239/240, and 0 022 μCi of Am-241

7.1.2 296-Z-3 Stack

The 296-Z-3 stack record sampler was originally designed and installed to meet ANSI N13 1 – 1969 standards, and is operated continuously Particulate sample air filters are collected and analyzed for total alpha and total beta, and periodically composited for isotopic analyses Adequacy of the sampling system is demonstrated by inspection, calibration, and maintenance activities as scheduled in current 241-Z Building procedures The existing sampling system is designed to sample a 2,500 cfm flow rate stack and consequently operates in a super-isokinetic mode due to the actual stack flow rate of approximately 600 cfm when one of two fans is in operation

The EPA and WDOH approved the continued use of the existing 296-Z-3 stack sampling system as an alternative monitoring in lieu of upgrades to literal compliance with 40 CFR 61 Subpart, H requirements The alternative monitoring request involves reporting released based on the maximum design fan flow rate (3000 cfm) for both fans operating, regardless of actual system flow. This approach will result in very conservative estimates of annual radionuclide emissions reported in the Radionuclide Air Emissions Report for the Hanford Site

7.1.3 296-Z-7 Stack

The new 296-Z-7 stack began operation in November 2001 It exhausts filtered air from the 2736-ZB Building The stack is about 50 ft high, 15.25 inches in diameter and is constructed of schedule-40 stainless steel The flow rate averages roughly 1,200 cfm with a maximum flow of 1800 cfm

The 296-Z-7 Stack exhausts filtered air from stabilization and packaging activities conducted in the PFP 2736-ZB building The stack began operating in November 2001 The stabilization and packaging activities are conducted predominantly in Rooms 642 and 641 The total exhaust air flow should normally be about 1550 – 1800 cfm The ventilation flow is powered by one or two fans located next to the 296-Z-7 stack All exhaust air is filtered with two stages of HEPA filtration with a minimum efficiency of 99 95 percent for particles with a median diameter of 0 3 micron

The HEPA filter housing located at the gloveboxes and Room 642 are Flanders® G1 type filter housings. The final HEPA exhaust filtration train located in HEPA filter Room 641B are Flanders® filter housings type BG bag-out containment series. The exhaust piping and fittings from the gloveboxes to the inlet of the final HEPA filtration exhaust trains located in HEPA filter room 641B are schedule-10S stainless steel. The exhaust piping and fittings from the discharge side (outlet) of the filter train to inlet of exhaust fans EF-1 and EF-2, located out-of-doors are schedule 20 carbon steel All valves that are used to isolate components (e g , HEPA filters, control valves, etc) are butterfly valves

7.1.3.1 Sample Probe

Two shrouded air-sampling probes, one flowing to a record sampler and one to a Canberra alpha CAM, monitor the stack exhaust The probes are identical, independent, mounted in parallel configuration and located approximately 25 feet above grade downstream of the exhaust fans The two probes were designed to the requirements of the ANSI N13 1 – 1999 standard (PNNL-13687) The approximate number of stack diameters from the top of the stack opening to the sampling nozzles is 12 4 The stack's emission sampling system consists of a continuous air monitor record sampler for particulate radionuclides and a flow monitor (see drawings H-2-829485-1 and H-2-892443)

The annual sample probe inspection conducted in November 2003 (as required per 40 CFR 61, Subpart H, Appendix B Method 114 Table 2 "Maintenance, calibrations and field check requirements") revealed no internal visible deposits and sample system cleaning was not required

7.1.3.2 Sample Transport Line

The sample streams are routed out of the stack and down to an instrument cabinet located at the base of the stack (refer to figure 5-4) After sampling and monitoring, air is returned via vacuum pumps to the stack at a location above the sample elevation Line losses associated with the record sampler have been estimated at 14 percent (PNNL-13687) with filter losses contributing an estimated 9 percent This represents a total overall correction factor of 0 78

The annual sample transport line leak test (as required per 40 CFR 61, Subpart H, Appendix B Method 114 Table 2 "Maintenance, calibrations and field check requirements") was conducted in November 2003 The transport line met the acceptance criteria of a leakage rate not greater than 5% flow at typical operating pressures.

7.1.3.3 Record Sampler

The flow to the record filter is controlled to a flow rate that is proportional to the stack flow Stack mass flow (compensated for temperature and pressure) is monitored using an annular flow element located in the stack just above the sampling location The flow element contains an integral temperature sensor Signals from the flow-temperature element are routed to a flow-indicating transmitter located in the instrument cabinet The transmitter displays mass flow and provides a proportional signal for sample flow control

7.1.3.4 Continuous Air Monitor

The sample flow for the alpha monitor is controlled to a fixed flow rate

Both the 291-Z-1 and 296-Z-7's sample filter media are exchanged biweekly and analyzed for gross alpha and gross beta activities, as described in Section 9.0, and composited for quarterly analysis of specific radionuclide concentrations

7.2 TECHNICAL SPECIFICATIONS PERTAINING TO THE EFFLUENT MONITORING SYSTEM (EMS)

PFP stack CAMs perform passive functions, which are to detect airborne radioactive material and activate alarms should the alarm set point on the CAM be exceeded CAMS do not provide an active function, which would actuate equipment or systems to prevent or mitigate an accident In most cases, the CAMs would not serve to reduce the consequences associated with a release of airborne radioactive material as most accidents involve a sudden release of material over a short period Potentially chronic releases from process operations are due to equipment failures (e.g , failed filters) and tend to be small in nature If these releases are sufficient to actuate the CAMs, operator action generally is adequate to limit the release so there is no offsite consequence

PFP stack CAM operability requirements set by technical specifications are presented in Table 7-2.

Surveillance requirements associated with operability of both 291-Z-1 and 296-Z-7 Stack CAMs are specified in ZH-100-101 (Gaseous Effluent Sampling and Monitoring System Inspection) as follows.

- VERIFY 291-Z-1 Stack alpha CAM sample flow rate is 2 0 cubic feet per minute +/- 20 percent (1 6-2 4 cubic feet per minute) Minimum frequency is daily
- VERIFY 296-Z-7 Stack alpha CAM sample flow rate is 2 0 cubic feet per minute +/- 20 percent (1 6-2 4 cubic feet per minute) Minimum frequency is weekly
- VERIFY 291-Z-1 Stack CAM alarm set point is less than the equivalent of 20,000 DCG-hour Minimum frequency is daily
- VERIFY 296-Z-7 Stack CAM alarm set point is less than the equivalent of 80 DAC hours Minimum frequency is weekly
- Perform FUNCTIONAL TEST of the 234-5ZA Annunciator panel ANN 714 lights and audible alarm. Minimum frequency is daily

The performance of the 296-Z-7 CAM is checked with respect to a serial numbered source per ZRC-100-106 (Operating the Canberra ASM-1000/1700R Alpha CAM System) This also includes alarm light and horn testing Minimum frequency is weekly.

The performance of the 291-Z-1 CAM is checked with respect to a serial numbered source per ZSE-24A-001 [Monthly 291-Z-1(291-Z)Stack Effluent Monitor Functional Test] This also includes alarm light and bell testing Minimum frequency is monthly

The 291-Z-1 CAM and the 296-Z-7 CAM are calibrated, respectively, per ZSE-24A-002 [Annual 291-Z-1 (291-Z) Stack Effluent Systems Calibration and Replacement] and ZSE-24A-012 (Annual 296-Z-7 Stack Effluent Systems Calibration and Replacement) Minimum frequency is annually.

The PFP stack record samplers also play an integral role in recognizing out-of-specification release trends Facility health physics personnel remove the record samples every 2 weeks for analysis at the Waste Sampling and Characterization Facility (WSCF). Data are retrieved from a computer database (Automated Bar Coding of All Samples at Hanford [ABCASH]) Any adverse trends can be recognized and acted upon by PFP personnel

Downtime limit requirements are in place for the record sampling and CAM systems. If a system failure occurs, loss-of-record sampling capabilities are expected to be corrected as quickly as practicable.

Details on the effluent monitoring equipment and alarms are provided for Stack 291-Z-1 and Stack 296-Z-7 in Table 7-3 and Table 7-4, respectively Both the 291-Z-1 Stack and 296-Z-7 stack monitoring and sampling system alarms sound remotely in Room 714 of the 234-5Z Building These alarms include CAM high radiation, CAM fail, and vacuum pump fail The stack CAM alarms also sound locally at the 2712-Z Building where the stack monitoring equipment is located

Table 7-1 Co Sampling Data, 291-Z-1 Stack

Sample Off Date	Record Sample		Co-Sampler	
	Uncorrected (uCi/ml)	Corrected (uCi/ml)	Uncorrected (uCi/ml)	Corrected (uCi/ml)
3/22/2001	3.3E-14	3.8E-14	1.5E-14	1.6E-14
4/6/2001	2.3E-14	2.7E-14	9.9E-15	1.1E-14
4/20/2001	8.9E-14	1.0E-13	1.8E-14	2.0E-14
5/4/2001	6.7E-15	7.7E-15	1.1E-14	1.2E-14
5/18/2001	9.3E-15	1.1E-14	1.2E-14	1.3E-14
6/1/2001	5.2E-14	6.0E-14	9.4E-15	1.0E-14
6/15/2001	7.4E-15	8.6E-15	5.3E-14	5.8E-14
6/29/2001	8.1E-15	9.4E-15	3.1E-14	3.4E-14
7/13/2001	1.4E-14	1.6E-14	2.2E-14	2.4E-14
7/27/2001	1.3E-14	1.5E-14	1.7E-14	1.9E-14
8/10/2001	8.5E-15	9.8E-15	9.8E-15	1.1E-14
8/23/2001	1.9E-14	2.2E-14	1.5E-14	1.6E-14
9/7/2001	2.2E-14	2.5E-14	1.9E-14	2.1E-14
9/21/2001	5.0E-14	5.8E-14	8.1E-14	8.9E-14
10/5/2001	1.0E-14	1.2E-14	5.8E-15	6.4E-15
10/19/2001	2.2E-14	2.5E-14	1.4E-14	1.5E-14
11/2/2001	1.2E-14	1.4E-14	1.1E-14	1.2E-14
11/16/2001	6.1E-15	7.1E-15	8.6E-15	9.5E-15
11/30/2001	1.4E-14	1.6E-14	1.5E-14	1.6E-14
12/14/2001	1.1E-14	1.3E-14	9.3E-15	1.0E-14
12/28/2001	8.7E-15	1.0E-14	8.8E-15	9.7E-15
1/11/2002	4.6E-15	5.3E-15	9.2E-15	1.0E-14
1/25/2002	6.6E-15	7.6E-15	5.6E-15	6.2E-15
2/8/2002	5.8E-15	6.7E-15	6.0E-15	6.6E-15
2/22/2002	7.5E-14	8.7E-14	1.8E-13	2.0E-13
3/8/2002	1.5E-14	1.7E-14	1.0E-14	1.1E-14
3/22/2002	4.4E-15	5.1E-15	1.9E-14	2.1E-14

Table 7-2 Plutonium Finishing Plant Stack Continuous Air Monitor Operability Requirements

Condition	Required action	Completion time
A Stack alpha CAM is inoperable	A 1 Establish equivalent alternate monitoring	2 Hours
	AND	
	A 2 1 Restore stack alpha CAM to an OPERABLE condition	72 Hours
	OR	
	A 2 2 1 Enter MODE 2, Limited plutonium handling operations in the affected process area(s) Discontinue plutonium processing and handling in affected process area(s)	72 Hours
	AND	
	A 2 2 2 Initiate a written RECOVERY PLAN to restore the stack alpha CAM to an OPERABLE condition	72 Hours

Table 7-3. Monitoring Instrumentation for Gaseous Effluent System, 291-Z-1 Stack

Instrument type	Maintenance frequency and type	Alarm set points
FQ-SPL-Z1 Stack flow totalizer	Annual calendar and monthly functional test	N/A
VS-SPL-Z1 Stack sampler vacuum alarm switch	Annual calendar and monthly functional test	Low alarm 3" Hg High alarm 9" Hg
VS-CAM-Z1 Stack CAM vacuum alarm switch	Annual calendar and monthly functional test	Low alarm 3" Hg High alarm 9" Hg
PI-CAM-Z1 Stack CAM vacuum gauge	Annual calendar	N/A
PI-SPL-Z1 Stack sampler vacuum gauge	Annual calendar	N/A
FI-CAM-Z1 CAM rotameter	Annual calendar (by PNNL)	N/A
FI-SPL-Z1 Record sampler rotameter	Annual calendar	N/A
CAM-Z1 Continuous air monitor	Annual calendar (by PNNL) and monthly functional test	30-40 cpm
ANN-714-W1 Stack CAM high-radiation alarm	Monthly functional test	30-40 cpm
ANN-714-W2 Stack CAM failure alarm	Monthly functional test	0 cpm
ANN-714-W3 CAM vacuum alarm	Monthly functional test	Low alarm 3" Hg High alarm 9" Hg
ANN-714-W4 Sampler vacuum alarm	Monthly functional test	Low alarm 3" Hg High alarm 9" Hg

cpm = counts per minute.

Table 7-4 Monitoring Instrumentation for Gaseous Effluent System, 296-Z-7 Stack

Instrument type	Maintenance frequency and type	Alarm set points
FIT-24A01 Stack flow totalizer	Annual calendar and monthly functional test	N/A
RK-24A02 Stack CAM (Canberra) vacuum switch	Annual calendar and monthly functional test	N/A
RK-24A01 Stack CAM vacuum gauge	Annual calendar	N/A
PI-24A03 Stack sampler vacuum gauge	Annual calendar	N/A
PI-24A02 CAM ASM Flow Display	Annual calendar (by PNNL)	N/A
- PI-2403 Record sampler rotameter	Annual calendar	<15 LPM
CAM-Z1 Continuous air monitor	Annual calendar (by PNNL) and monthly functional test	<80 DAC-Hrs
ANN-714-W19 Stack CAM high-radiation alarm	Monthly functional test	<80 DAC-Hrs
ANN-714-W20 Stack CAM failure alarm	Monthly functional test	<80 DAC-Hrs

cpm = counts per minute

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Figure 7-1. 291-Z-1 Shrouded Probe

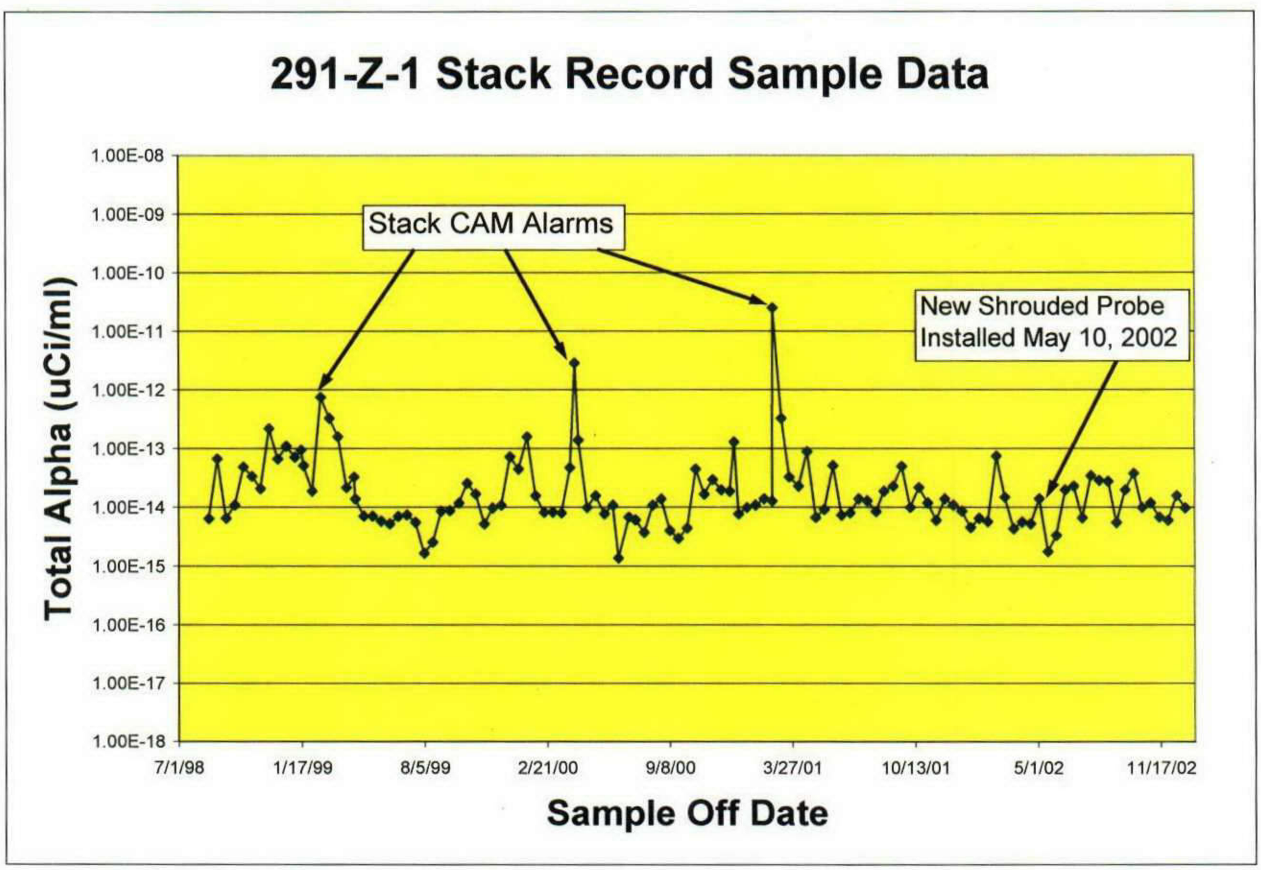

Figure 7-2. 291-Z-1 Record Sample Data CY 1999 - 2002

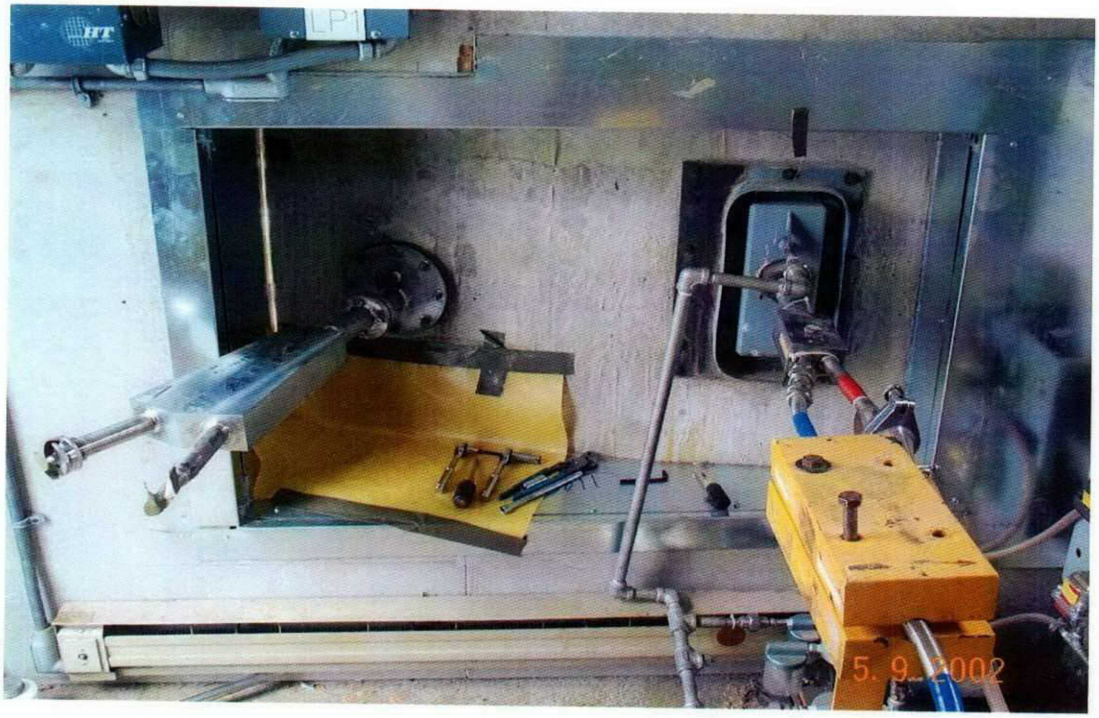

Figure 7-3. Location of Existing Stack Sampling and Co-Sampling Extraction Probes

Figure 7-4. Co-sampling Open Face Shrouded Probe Assembly

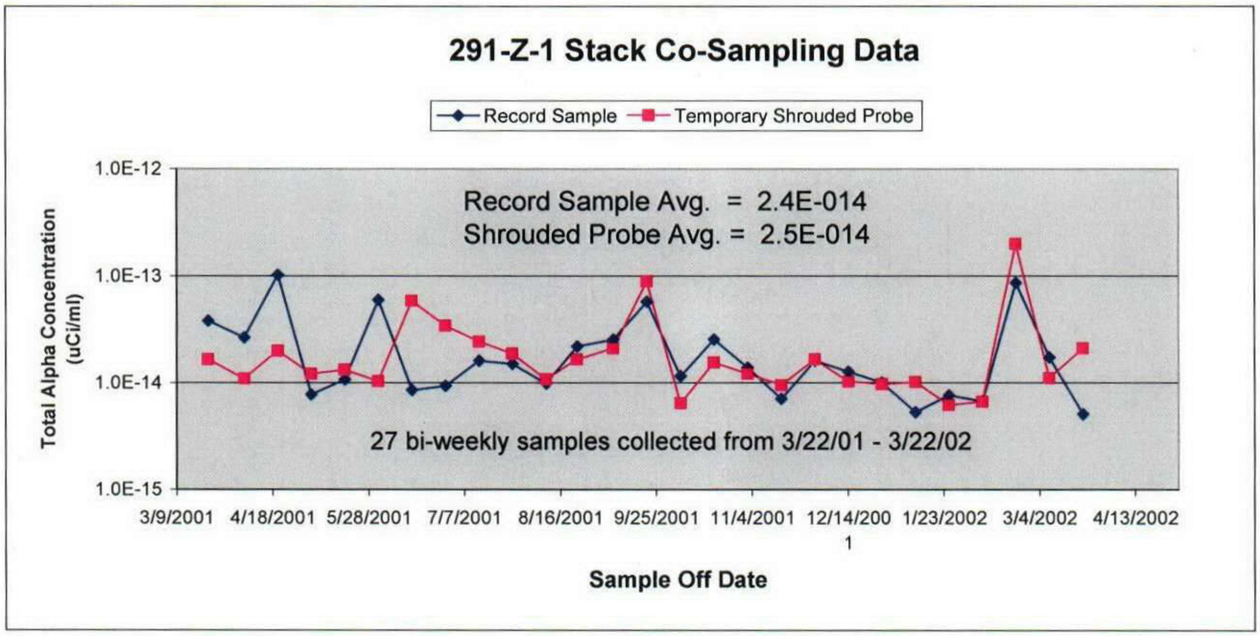

Figure 7-5. 291-Z-1 Stack Co-Sampling Data

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8.0 HISTORICAL MONITORING/SAMPLING DATA FOR EFFLUENT STREAMS

This section presents recent monitoring and sampling data for the PFP effluent streams A discussion also is provided that relates these data with future projected emissions

8.1 NORMAL CONDITIONS

This section presents detailed monitoring and sampling data for the past 4 years of published data for the 291-Z-1 Stack, 296-Z-3 Stack, and the 296-Z-7 Stack These data have been retrieved from annual reports (e g., DOE/RL-2003-19) A comparison of the available data to both the current and future expected release quantities is provided based on the current status of operations and any future plans for the facilities

8.1.1 Radioactive Releases

Sample data for the 291-Z-1, 296-Z-3 and 296-Z-7 Stacks and other PFP stacks are maintained in the ABCASH database. A unique electronic data processing (EDP) code identifier designates each sample location The 291-Z-1 Stack record sample is identified by Z810 and the CAM is identified by Z811 The 296-Z-3 Stack record sample is identified by Z813 and the CAM is identified by Z812 The 296-Z-7 Stack record sample is identified by Z818 and the CAM is identified by Z819 Each individual sample also is given a unique identification number Tables 8-1 and 8-2 provide historical radiological data based on annual summaries

The flow rate for Stack 291-Z-1 is assumed to be 290,000 cubic feet per minute for release calculations and emission reporting purposes For internal use by PFP Maintenance and best management practices, the 291-Z-1 Stack flow rate has also been determined according to procedure 1-ZM-085 (Vent and Balance Stack Flow Measurement) Procedure 1-ZM-085 required completion of pitot tube flow measurement traverses of various tributary ducts to the stack and summing these, thus arriving at total stack flow These measurements showed that, historically, the stack flows have averaged 230,000 cubic feet per minute to 250,000 cubic feet per minute from the late 1970's to the late 1990's. Procedure 1-ZM-085 became obsolete in 1999 when it was determined that the stack flow measurements were also being obtained in conjunction with annual aerosol testing of final stage HEPA filters

The 296-Z-3 Stack flow typically averages around 600 cfm. As part of the EPA acceptance of alternative stack monitoring, the maximum fan capacity value of 3000 cfm will be used to calculate estimates of radionuclide releases

The 296-Z-7 Stack flow is measured yearly in conjunction with aerosol testing of final stage HEPA filters Hep-14, Hep-15, Hep-16 and Hep-17 The measured stack flow rate was 1252 cubic feet per minute in 2002.

Future processing operations were discussed in Section 2 2 of this FEMP, which included a list of approved stabilization alternatives for plutonium-bearing materials at the PFP Doses to the hypothesized offsite MPR are not expected to change significantly as a result of these planned operations For the purposes of the environmental impact statement, the PFP MPR hypothetically was assumed to reside for the entire year at a point 25 kilometers east of PFP The final PFP stabilization environmental impact statement (EIS) (DOE/EIS-0244F) projected a conservative upper bound dose estimate of 0 15 mrem to the MPR Actual doses are expected to be much lower

The 40 CFR 61 subpart H NESHAP emission limit is 10 mrem per year to the Hanford site wide maximally exposed individual (MEI) due to accumulated emissions from all point sources Table 8-5 provides a summary of the Hanford site MEI dose estimates for 4 years, as published in annual environmental release reports The 291-Z-1 Stack contributed approximately less than 1 percent of the total estimated Hanford Site MEI dose during Calendar year 2002, and 296-Z-7 contributed a much smaller fraction As indicated from the reported dose estimates, the Hanford Site and, therefore, PFP are orders of magnitude lower than the emission limit

8.1.2 Nonradioactive Releases

The only routine nonradioactive substance historically released from the 291-Z-1 Stack that exceeded reportable quantities was Carbon Tetrachloride (CCl_4), which was released during past PRF operations However, the PRF process has been shut down CCl_4 is not used in any operating process at PFP, and there are no plans for use in future operations

Small quantities of hydrogen fluoride have been released routinely during past operations, but future operations will not involve the use of hydrogen fluoride On May 14, 1997, a chemical makeup tank in PRF pressurized and resulted in a violent rupturing of the tank Emissions of nitrogen oxides were estimated (given the quantity of chemicals in the tank) as high as 35 pounds by way of the 291-Z-1 Stack, and possibly through two small holes in the roof of PRF created during the event

The following are the primary alternatives for each of the plutonium-bearing inventory categories with the expected emission constituents, if any The information is taken from the PFP stabilization EIS (DOE/EIS-0224F) The final stack release rates are based on conservative assumptions to bound the maximum release rates of plutonium and gases. The release rates are continuous averages for the process described

- Plutonium-bearing solutions
- Ion exchange: no air emissions
- Vertical calcination Nitrogen oxides (9 8 E-3 grams per second) A ceramic filter and a scrubber unit remove essentially all particulate matter
- Muffle furnace (thermal stabilization) PM10 (2.3 E-8 grams per second)
- Oxides, fluorides, and process residues· Thermal stabilization using muffle furnaces PM10 (3 3 E-8 grams per second)
- Metals and alloys Repackaging followed by thermal stabilization Particles less than 10 microns in size (PM10) (2 8 E-8 grams per second)
- Polycubes and combustibles. Pyrolysis. PM10 (2.8 E-9 grams per second), styrene (7 4 E-4 grams per second), carbon monoxide (1 7 E-3 grams per second)

The expected air contaminants fall into two categories of regulated pollutants· specifically, criteria pollutants (carbon monoxide, nitrogen dioxide, and particulate matter) and a hazardous air pollutant (styrene) The emitted particulate matter would be emitted as very fine particulates after HEPA filters filter the exhaust air. The emitted particulate matter therefore would be referred to as PM10 A portion of the PM10 includes plutonium oxide. The release rates shown previously represent small process exhausts, compared with many industrial process exhausts

Ground-level concentrations of these contaminants were estimated by using an atmospheric dispersion model The maximum downwind contaminant concentrations projected by the computer model were compared to ambient air standards When these concentrations, added to measured background levels, were compared with the applicable ambient air standards, all of the downwind concentrations were found to be significantly lower than the standards Therefore, impacts from the alternatives mentioned were found to be insignificant The increase in criteria air pollutant emissions from the stabilization alternatives are below the significant rates listed by Ecology For further detail on these findings, refer to DOE/EIS-0244F

8.2 UPSET CONDITIONS

On March 3, 1999, a high-radiation alarm sounded at the 291-Z-1 stack The concentration of alpha activity was conservatively estimated by the facility personnel to be 8 5 E-05 Ci of Pu0239/240 This release was accounted for in routine record sampling and analysis The cause of the alarm was believed to be from fixed contamination on the inside of the stack that had flaked off The cause of the flaking was very likely high winds, of up to 50 mph, that induced the 200-ft high stack to sway slightly No work in the facility, such as in gloveboxes, occurred during this period, eliminating this as a possible source for the transient elevation in release concentration that triggered the high-radiation alarm The sample filter was collected and sent to WSCF for analysis The event was reported to WDOH See figure 7-2 for more information.

On April 6, 2000, during a routine functional test of the 291-Z-1 stack CAM, a plant worker accidentally dropped a wrench onto the CAM causing it to annunciate The event was reported as a noncompliance in accordance with WAC 246-247-080(5) A conclusion was reached that no emissions connected with the high readings within the sampling line actually escaped the stack For purposes of conservatively estimating a potential dose to the nearest member of the public, a model was nonetheless constructed that did assume a release, based upon the 3 6E-05 Ci amount of radioactive material dislodged from, but contained within, the sampling line The event was reported to WDOH See figure 7-2 for more information.

On February 23, 2001 a velocity probe was extracted from the 291-Z-1 Stack. During this activity, it was speculated that the stack sample line, located very near the work, was bumped dislodging loose radioactive particles from the interior of the sample system The dislodged particles were drawn by the sampling system vacuum pump onto the CAM sample filter paper and the record sample filter paper The sudden, short-term deposition of a larger quantity of radioactive particles onto the CAM sample caused the alarm to annunciate. After a brief period, in which several filters were changed out in rapid succession, the increased airborne concentrations within the sampling line subsided to normal operational levels Investigation of the incident found the actual stack emissions during this localized sample system incident remained at normal levels. Upstream stack sampling and nearby ambient air monitoring confirmed no increase in actual stack emissions The record sample data collected during this event were used to conservatively calculate annual emissions The event was reported to WDOH See figure 7-2 for more information.

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Table 8-1 291-Z-1 Stack Emissions for Calendar Years 1999-2002

Radionuclide	1999		2000		2001		2002	
	Conc (uCi/ml)	Release (Ci)	Conc (uCi/ml)	Release (Ci)	Conc (uCi/ml)	Release (Ci)	Conc (uCi/ml)	Release (Ci)
Pu 238	9 6 E-16	4 8 E-6	2 2 E-15	1 1 E-5	8 1 E-16	4 1 E-6	2 3 E-16	1 2 E-06
Pu 239,240	3 4 E-14	1 7 E-4	9 4 E-14	4 8 E-4	4 0 E-14	2 0 E-4	1 3 E-14	6 4 E-05
Pu 241	2 4 E-14	1 2 E-4	6 1 E-15	3 1 E-4	2 6 E-14	1 3 E-4	1 4 E-14	7 2 E-05
Am 241	9 0 E-15	4 5 E-5	1 7 E-15	8 7 E-5	7 4E-15	3 7 E-5	2 4 E-15	1 2 E-05

Table 8-2 296-Z-3 Stack Emissions for Calendar Years 1999-2002

Radionuclide	1999		2000		2001		2002	
	Conc (uCi/ml)	Release (Ci)	Conc (uCi/ml)	Release (Ci)	Conc (uCi/ml)	Release (Ci)	Conc (uCi/ml)	Release (Ci)
Pu 238	2 7 E-15	3 5 E-08	7 4 E-16	9 6 E-09	1 4 E-15	1 3 E-08	N D	N D
Pu 239,240	2 2 E-15	2 9 E-08	6 4 E-16	8 3 E-09	1 3 E-15	1 2 E-08	2 9 E-15	2 8 E-08
Pu 241	5 0 E-15	6 5 E-08	1 0 E-15	1 3 E-08	2 4 E-15	2 3 E-08	7 4 E-15	7 1 E-08
Am 241	7 7 E-16	1 0 E-08	3 3 E-16	4 3 E-09	6 4 E-16	6 2 E-09	1 6 E-15	1 5 E-08

N D = Non detectable

Table 8-3 296-Z-7 Stack Emissions for Calendar Years 2001 – 2002

Radionuclide	2001		2002	
	Concentration (uCi/ml)	Release (Ci)	Concentration (uCi/ml)	Release (Ci)
Pu 238	2 4 E-16	7 3 E-09	Non Detectable	N/A
Pu 239,240	5 5 E-16	1 7 E-08	2 2 E-17	6 0 E-10
Pu 241	5 5 E-15	1.8 E-07	Non Detectable	N/A
Am 241	5 1 E-17	1 6 E-09	Non Detectable	N/A

Table 8-4 Effective Dose Equivalent for Point Sources

Calendar Year	291-Z-1		296-Z-3		296-Z-7		Hanford Site
	Mrem/yr	% Total	Mrem/yr	% Total	Mrem/yr	% Total	
1999	2 8 E-04	0 96 %	8 5 E-08	<0 001%	-	-	2 9 E-02
2000	7 9 E-04	1 7 %	3 0 E-08	<0 0001%	-	-	4 6 E-02
2001	2 8 E-04	0 23 %	3 6 E-08	<0 0001%	3 1 E-08	<0 001%	1 2 E-01
2002	9 6 E-05	0 42 %	6 0 E-08	<0 001%	7 3 E-10	<0 0001%	2 3 E-02

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9.0 SAMPLE ANALYSIS

Sample analysis and sample management are discussed in this section

The analytical laboratory procedures for the FEMP activities are identified in two quality assurance project plans (QAPjP), and the annual statement of work as follows

- HNF-EP-0528-5, *NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions*
- HNF-EP-0835-9, Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Effluent and Environmental Program during Calendar Year 2003

9.1 SAMPLE HANDLING AND ANALYSIS

This section describes sample handling and analysis requirements

9.1.1 Record Sample Exchange

The operations group taking the sample initiates sample identification Sampling personnel use the ABCASH system to provide electronic sample identification and chain of custody Sample custody is transferred when the analytical laboratory receives the properly marked sample EDP codes are assigned to each discharge point monitoring and sampling equipment units

Along with all the samples, which are taken from the gloveboxes, the record sampler filter paper, and the CAM, sample filters are sent to an analytical laboratory Record and sample filters are exchanged per PFP specified methods

Tracking of samples and sample data are governed by ABCASH

9.1.2 CAM Filter Exchange

CAM filters are exchanged per PFP specified methods

9.2 SAMPLE ANALYSIS

Minimum detectable concentrations are provided in Table 9-1

The analytical laboratory work provided by the WSCF for the Environmental Compliance Program are referenced in HNF-EP-0835, latest edition The sample and analysis requirements, composite sample reporting requirement, year-end data reporting and laboratory procedures are described.

9.2.1 Laboratory Analysis

When the sample reaches WSCF, the record sample is held for 7 days to allow the short-lived naturally-occurring isotopes to decay The sample is counted for alpha and beta readings These readings are documented and placed in storage for further sampling or analysis Quarterly, these samples are gathered and dissolved for radio-isotopic analysis The results of these analyses are reported annually The CAM samples are not treated as record samples unless specifically requested

The sample analysis services provided by WSCF are defined in a statement of work for services provided by WSCF published annually (e.g , HNF-EP-0835)

9.3 U.S. DEPARTMENT OF ENERGY ANALYTICAL AND LABORATORY GUIDELINES

The analytical and laboratory procedures for the FEMP activities are identified in HNF-EP-0528 General requirements for laboratory procedures, data analyses, and statistical treatment are addressed in Table 9-2

The following elements identified in DOE/EH-0173T are also addressed in HNF-EP-0528

- Procedures preventing cross contamination
- Documentation of methods
- Gamma emitting radionuclides
- Calibration
- Handling of samples
- Analysis method and capabilities
- Gross alpha, beta, and gamma measurements
- Direct gamma-ray spectrometry
- Beta counters
- Alpha-energy analysis
- Radiochemical separation procedures
- Reporting of results
- Counter calibration
- Inter-calibration of equipment and procedures
- Counter background
- Quality assurance

9.4 DATA COLLECTION AND REVIEW

Tracking of radioactive airborne emissions sample data is controlled through assignment of unique EDP codes for each sample location. These EDP codes are used by WSCF personnel to report the results in accordance with the QAPjP for radioactive emissions data.

9.4.1 Sample Data Examination and Delivery

Sample data examination and delivery to the analytical laboratory follow onsite methods

Table 9-1 Minimum Quantifiable Concentrations for Specific Radionuclides as Measured in Bi-Weekly Air Samples

Radionuclide	Minimum quantifiable concentration (microcuries per milliliter)
$^{239,240}Pu$	2.0×10^{-15}
^{238}Pu	2.0×10^{-15}
^{241}Am	1.9×10^{-15}
$^{89,90}Sr$	1.9×10^{-14}
$^{106}Ru\backslash Rh$	3.4×10^{-13}

Table 9-2 Data Analyses and Statistical Treatment

Element	Documentation
Summary of data and statistical treatment requirements	HNF-SD-CP-QAPP-017
Variability of effluent and environmental data	HNF-EP-0527-12
Summarization of data and testing for outliers	Statistical identification of control standards are performed by the Laboratory Measurement Control System database program during the annual review of data for setting control limits Outliers are evaluated.
Treatment of significant figures	HNF-SD-CP-QAPP-017
Parent-decay product relationships	Parent-decay product relationships are not accounted for in laboratory operating procedures
Comparisons to regulatory or administrative control standards and control data	WSCF participates in the EPA Intra-Comparison Program
Quality assurance	HNF-SD-CP-QAPP-017

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10.0 NOTIFICATION AND REPORTING REQUIREMENTS

Notifications and reporting of specific events related to environmental releases and/or events involving effluents and/or hazardous materials are made according to DOE Orders 5400 5, 232.1A, and HNF-PRO-15333 "Environmental Protection Processes" Specific implementation, where required, is included in the appropriate occurrence categorization, notification, and reporting procedures

10.1 OCCURRENCE IDENTIFICATION AND IMMEDIATE RESPONSE

Personnel will identify events and conditions and promptly notify management of such occurrences

- Call 911 if immediate help such as fire, ambulance, or Hanford Patrol is required
- Call 373-3800 (Patrol Operations Center) if assistance other than fire, ambulance, or Hanford Patrol is required
- After requesting necessary outside assistance, personnel will notify the supervisor, who will notify the facility and the building emergency director (BED). The BED will notify the Occurrence Notification Center ONC (376-2900), at which time the single point of contact (SPOC) will be notified

Operations personnel will take appropriate immediate action to stabilize or return the facility/operation to a safe condition Actions taken in response to nonroutine releases as evidenced by high sample results from liquid and gaseous effluent sampling will be documented

The oversight organizations will notify the DOE-RL of the event after receiving notifications from, and discussing the event with, the facility manager

10.2 OCCURRENCE CATEGORIZATION

Occurrences (environmental) are categorized as soon as practical using specific onsite criteria

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11.0 INTERFACE WITH NEAR-FACILITY MONITORING

The Environmental Monitoring Plan United States Department of Energy Richland Operations Office (DOE/RL-91-50 rev. 3) documents two distinct but related components of the environmental monitoring program; environmental surveillance conducted by PNNL and effluent monitoring conducted by FH. Environmental surveillance consists of surveillance of all environmental media to demonstrate compliance with regulations Effluent monitoring includes facility effluent monitoring (e g. end of pipe) as well as near-facility environmental monitoring Projected EDEs, reported in this FEMP, are the products of effluent monitoring data

11.1 PURPOSE

The Near-Facility Monitoring (NFM) program provides facility-specific environmental monitoring to protect the environment adjacent to facilities under the responsibility of FH and to ensure compliance with federal, state, and local environmental regulations

The objectives of NFM are to evaluate the following

- Compliance with DOE, EPA, Ecology, WDOH, and internal FH team environmental radiation protection requirements and guides
- Performance of radioactive waste confinement systems
- Trends of radioactive materials in the environment at and adjacent to nuclear facilities and waste disposal sites

Specifically, NFM is developed to

- Monitor all inactive, existing, and new low-level waste disposal sites to assess both radiological and nonradiological hazards (DOE Order 435 1)
- Determine the effectiveness of effluent treatment and controls in reducing effluents and emissions (DOE/EH-0173T)
- Detect and quantify unplanned releases (DOE/EH-0173T, 40 CFR 302, WAC 173-303-145, and DOE Orders 231.1A)
- Monitor fugitive emissions and diffuse sources from contaminated areas for compliance with NESHAPs (40 CFR 61, DOE/EH-0173T and WAC 246-247), Toxic Air Emissions Inventory (40 CFR 265, Subparts AA & B13), State Air Operating Permit Program (40 CFR 70, WAC 173-401)
- Monitor all surplus facilities before decontaminating or decommissioning (DOE Order 435 1)
- Monitor new and existing sites, processes, and facilities for potential impacts and releases (DOE Order 231 1A and DOE/EH-0173T)
- Monitor and assess radioactive contamination and potential exposure to employees and the public (DOE Orders 5400.5, 231 1, DOE/EH-0173T and 10 CFR 835)

NFM provides a level of assurance to FH that the effluent and contamination controls for the various facilities and waste sites are effective

11.2 MEDIA SAMPLED

Media include ambient air, surface water, groundwater, external radiation dose, soil, sediment, vegetation, and animals at or near active and inactive facilities and/or waste sites Parameters monitored include the following, as needed: pH, water temperature, radionuclides, radiation exposure, and hazardous constituents Animals that are not contaminated, as determined by a field instrument survey, are released to a nonhazardous environment

Samples are collected from known or suspected effluent pathways (e.g , downwind of potential releases, liquid streams, or proximal to release points) To avoid duplication, FH relies on existing sample locations where PNNL previously established sample sites (e g , air samplers in the 300 Area) Animal samples are collected at or near facilities and/or waste sites

Surveys to detect surface radiological contamination are conducted near and on liquid waste disposal sites (e.g , cribs, trenches, drains, retention basin perimeters, pond perimeters, and ditch banks), solid waste disposal sites (e g , burial grounds and trenches), unplanned release sites, tank farm perimeters, stabilized waste disposal sites, roads, and firebreaks There are multiple sites where radiological surveys are conducted in the 100 Areas, the 200/600 Areas, and in the 300/400 Areas

NFM will be reviewed at least annually to determine that the appropriate effluents are being monitored and that the monitor locations are in position to best determine potential releases.

11.3 COMMUNICATION

FH and PNNL will compare and communicate results of their respective monitoring programs at least quarterly and as soon as possible under upset conditions

Results of NFM are published in annual reports The radionuclide values in these reports are expressed in curies, or portions thereof, for each radionuclide per unit weight of sample (e g , picocuries per gram) or in field instrument values (e.g , counts per minute). Values are reported in this manner, rather than EDE, which is calculated as the summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor

12.0 QUALITY ASSURANCE (QA)

HNF-EP-0528 describes the QA requirements associated with NESHAP compliance The QAPjP is consistent with the requirements in 10 CFR 830, NQA-1, and EPA QA/R-5 In addition, QA requirements in 40 CFR 61, Appendix B, Method 114, will be considered when performing monitoring calculations and establishing monitoring systems for airborne emissions

12.1 OBJECTIVE

The objective of this plan is to document and describe QA requirements for facilities implementing the FEMPs.

12.2 REQUIREMENTS

HNF-EP-0528-5 has been developed to implement the overall QA program requirements for radioactive airborne emissions data collection and reporting activities The QAPjP applies specifically to field activities, laboratory analyses, and continuous monitoring performed for all FH managed facilities

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13.0 INTERNAL AND EXTERNAL PLAN REVIEW

This FEMP should be reviewed and updated as necessary after each major change or significant facility modification

FH prepares an annual effluent discharges report for each area on the Hanford Site to cover both airborne and liquid release pathways In addition, a report on the air emissions and compliance to the NESHAP is prepared by FH and submitted to the EPA as well as DOE Headquarters

Facility management is required to approve all changes to the FEMPs, including those generated during reviews and updates. FH is responsible for assigning appropriate personnel to perform the document reviews, assessments, and approvals as necessary, to ensure program integrity

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14.0 COMPLIANCE ASSESSMENT

Based on the information presented previously, there are no PFP effluent streams out of compliance with the requirement to provide monitoring Furthermore, all radioactive and nonradioactive hazardous materials that potentially are released through these streams currently are being monitored if required

The 291-Z-1 Stack is required to meet the measurement requirements outlined under NESHAP (40 CFR 61, Subpart H) This stack was declared compliant with the NESHAP by EPA Region 10 in September 1995 The 291-Z-1 Stack sampling probe was replaced on May 10, 2002 per WDOH letter AIR 02-308, dated March 25, 2002 and EPA letter OAQ-107, dated March 14, 2002

The 296-Z-3 Stack sampling and monitoring process was approved by EPA as an alternative stack flow measurement and sample extraction procedure as documented in a letter dated June 26, 2003 The WDOH approved DOE/RL-2002-72 Rev. 2 Radioactive Air Emissions Notice of Construction for Transition of the 241-Z Liquid Waste Treatment Facility at the Plutonium Finishing Plant, 200 West Area, Hanford Site, Richland, Washington" in WDOH letter AIR 03-1109 dated November 21, 2003

The 296-Z-7 Stack sampling and monitoring process was approved by WDOH in DOE/RL-2000-42 "Radioactive Air Emissions Notice of Construction for Plutonium Finishing Plant Project W-460, 'Plutonium Stabilization and Handling' "as documented in WDOH letter AIR-99-709

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15.0 SUMMARY AND CONCLUSIONS

This FEMP assessed the magnitude of routine and potential liquid and airborne effluent releases from the PFP Complex to determine the compliance of effluent monitoring systems and sampling programs with applicable federal, state, and local regulations. Based on the data reviewed, and according to regulations, the 291-Z-1, 296-Z-3 and 296-Z-7 stacks were determined to require a monitoring plan according to the regulations The adequacy and compliance of the monitoring systems or sampling programs are documented in this plan Compliance was determined by comparing the existing systems and procedures to applicable regulations and accepted guidance

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